Emulex Driver for Linux Download Manual

Version 2.01g

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Supported Features

- Driver installation as loadable module (recommended) or in kernel
- Topology support: FC-AL, point to point, fabric with auto-topology negotiation
- Support for 1 and 2 Gb with auto rate negotiation
- Protocols: SCSI-FCP, FCP-2 (FC-Tape profile, including use of ADISC instead of PLOGI), IP (except where noted) /FC initiator mode
- Persistent bindings by WWNN, WWPN or D_ID (different methods can be set on an adapter port basis)
- Support for up to thirty-two HBAs per host
- Monitoring, parameter and binding settings through HBAnyware Java-based graphical user interface
- Support for Common HBA API

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New Features in this Release

Linux version 2.01g:

- Is an Open Source Compliant driver.
- Supports Red Hat Enterprise Linux 3 (32-bit and 64-bit Intel).
- Supports SLES 8, including SP3 (32-bit and 64-bit Intel).
- Includes HBAnyware 2.00a13 for adapter monitoring, firmware update, parameter management.
- Supports new adapters: LP952L, LP982, LP10000DC, LP10000, LP1050DC, LP1050, LP10000ExDC and LP1050Ex.
- Adds internal revision numbers to the lpfc.conf file so changes to file contents can be tracked.
- Defaults to IP support off.
- Enhances persistent binding, including support to collect and use information for persistent binding, and port-by-port adapter binding method.
- Makes driver file name changes consistent.
- Increases the maximum number of HBAs from 16 to 32.
- Includes an enhanced scheduler balancing request across LUNs using a round-robin scheme.
- Adds register symbolic node name support.
- Adds FDMI support.
- Adds additional debug messages.
- Uses Linux-defined constants SCSI_SENSE_BUFFERSIZE to determine how much Sense Data to return.

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- Contains additional lpfc.conf parameters.
- Uses writel/readl in all architectures.
- Supports extended dma addressing for Red Hat Enterprise Linux 3.

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Driver Information

Prerequisites

This device driver is appropriate for the following architectures:

32-bit Intel Architecture, 64-bit Itanium Processor Family

Distributions:

- Red Hat Enterprise Linux 2.1 including all published updates
- Red Hat Enterprise Linux 3.0 including all published updates
- SuSE Linux Enterprise Server 8 including all published service packs
- This driver may also operate in other 2.4 kernel based distributions. It will not operate with 2.2 or 2.6 kernels.

This driver has been tested by Emulex in a representative sample of array and switch configurations, using the following distributions and kernels as provided by the distributions:

32-bit Intel Architecture:

- Red Hat Enterprise Linux 2.1 Update 3 with kernel 2.4.9-e.34
- Red Hat Enterprise Linux 3.0 Update 1 with kernel 2.4.21-9.EL
- Red Hat Enterprise Linux 3.0 Update 2 with kernel 2.4.21-15.EL
- SuSE Linux Enterprise Server 8 with 2.4.19 kernel
- SuSE Linux Enterprise Server 8 SP 3 with 2.4.21-138 kernel

64-bit Itanium Processor Family:

- Red Hat Enterprise Linux 2.1 Update 3 with kernel 2.4.18-e.40
- Red Hat Enterprise Linux 3.0 all kernels
- Red Hat Enterprise Linux 3.0 Update 1 with kernel 2.4.21-9.EL

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- Red Hat Enterprise Linux 3.0 Update 2 with kernel 2.4.21-15.EL
- SuSE Linux Enterprise Server 8 SP3 with 2.4.21-112 kernel

Additional storage array, configuration and application testing has been conducted by Emulex partners and OEMs. Contact your supplier for additional information.

Compatibility

- LP10000ExDC and LP1050Ex (minimum firmware version 1.90a4)
- LP10000DC and LP10000 (minimum firmware version 1.80a2)
- LP1050DC and LP1050 (minimum firmware version 1.90a4)
- LP9802DC (minimum firmware version 1.00a4)
- LP9802 (minimum firmware version 1.00a2)
- LP982 (minimum firmware version 1.81a1)
- Emulex Fibre Channel host bus adapters LP9402DC, LP9002DC, LP9002L and LP9000 (minimum firmware version 3.90a7)
- LP952L (minimum firmware version 3.92a2)
- Emulex Fibre Channel adapters LP8000 and LP8000DC
    - If your HBA has a Dragonfly chip version 2.00 or greater, use firmware version 3.90a7.
    - If your HBA has a Dragonfly chip below version 2.00, use firmware version 3.30a7.
- Emulex Fibre Channel host bus adapter LP7000E (minimum firmware version 3.21a0)

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Things to Know Before You Download

- Select a device driver download if you are updating an existing driver on your hard drive, or you want to install the driver on your hard drive.

- For each LightPulse adapter involved in IP networking, there must be an **ifcfg–lpfn *< 0–N >*** file containing network-specific information. This file need not be present if the driver is being used only for SCSI support.

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Known Issues

- **FCP – Discovering Disk Drives.** To list all the SCSI devices discovered at boot time, enter this command:

```
cat /proc/scsi/scsi
```

- Although the driver recognizes disk drives at boot time, you may not be able to use those drives until special file entries are created for them. By default, Linux provides special fields for up to 16 SCSI devices. With the Emulex driver, targets 1 through 255 are supported, with up to 128 LUNs per target. To create additional special files, use the 'MAKEDEV' command in the /dev directory.

> **Note** All SCSI device files are created if you are using SuSE SLES 8.

- If you are using a device driver download, you must first have a SCSI or IDE boot/ root device in order to create a Fibre Channel (lpfcdd) boot device.

- If you are running SuSE SLES and want to build the driver as a kernel module, you need to edit the Makefile. For step-by-step instructions, see the online Installation manual (Build Driver into Kernel, IP Functionality procedure).

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Files Included in this Release

This kit includes the following files:

File Name	Description
README	Release notes for Linux driver Version 2.01g.
Makefile	Used to build and install the driver as a standalone module
Install.sh (tar file only)	Shell script that installs the link to lpfc.conf file and /etc
Remove.sh (tar file only)	Shell script that removes the link to lpfc.conf file and /etc.
lpfc.conf	Configuration file for the main driver and for multiple adapters in the system
lpfc.spec	RPM spec file used to build a distributable RPM file containing driver sources
core.c	Driver source file
elx_cfgparm.h	Driver source file
elx_clock.h	Driver source file
elx_crtn.h	Driver source file
elx_disc.h	Driver source file
elx.h	Driver source file
elx_hw.h	Driver source file
elx_ioctl.h	Driver source file
elx_logmsg.h	Driver source file
elx_mem.h	Driver source file
elx_os.h	Driver source file
elx_os_scsiport.h	Driver source file
elx_sched.h	Driver source file
elx_scsi.h	Driver source file
elx_sli.h	Driver source file
elx_util.h	Driver source file

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hbaapi.h	Driver source file
lpfc_cfgparm.h	Driver source file
lpfc_core.c	Driver source file
lpfc_crtn.h	Driver source file
lpfc_diag.h	Driver source file
lpfc_disc.h	Driver source file
lpfc_hba.h	Driver source file
lpfc_hw.h	Driver source file
lpfc_ioctl.h	Driver source file
lpfc_ip.h	Driver source file
lpfcLINUXfcp.c	Driver source file
lpfcLINUXlan.c	Driver source file
lpfc_module_param.h	Driver source file
prod_crtn.h	Driver source file
prod_linux.c	Driver source file
prod_os.h	Driver source file

Utilities tar File

File Name	Description
HBAnyware-[version]-linux.tgz	HBAnyware application, in compressed tar file format
HBAnywareSSC-[version]-linux.tgz	HBAnyware Security application, in compressed tar file format
README_SSC.txt	HBAnyware installation README file
README.txt	HBAnyware Security installation README file

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Utilities RPM File

File Name	Description
HBAnyware-[version].[platform]-[pkg_inst].rpm	RPM install package for the HBAnyware application
HBAnywareSSC-[version].[platform]-[pkg_inst].rpm	RPM install package for the HBAnyware Security application
README.txt	HBAnyware installation README file
README_SSC.txt	HBAnyware Security installation README file

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Verifying the Dragonfly Chip Version

There are three methods for determining the Dragonfly chip version: Looking at the Host Bus Adapter, running the DOS utility, or running the UNIX-based utility.

Looking at the Host Bus Adapter

The Dragonfly version number can be found on the top of the large chip, usually after the term "DRAGONFLY" or "DFLY".

Running the DOS Utility

1. Boot up the computer in DOS.
2. Enter this command to start the lp6dutil program.

```
c:\>lp6dutil
```

   The lp6dutil program runs preliminary tests on all host adapters.

3. Press the Return or Enter key until the main menu is displayed. The lp6dutil utility resets all host adapters and resource information for all host bus adapters is displayed.

   Note Press 0 to go back to the previous screen.

```
1 - Test Host Adapters
2 - Modify Test Options
3 - Restart Host Adapters
4 - Input/Output
5 - Maintenance
6 - Show Host Adapters Info
7 - Quit
```

4. Select 6, Show Host Adapter Info.

   The Option menu is displayed.

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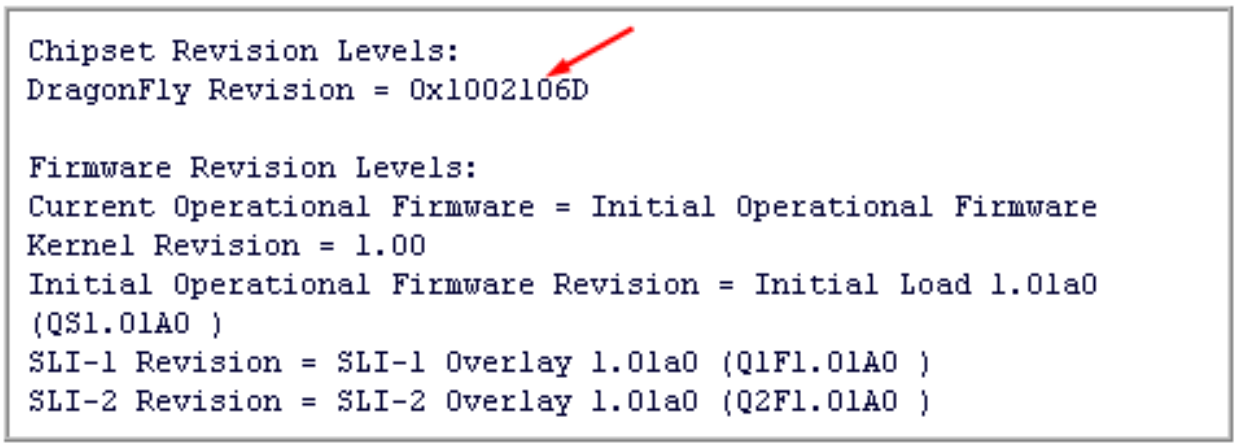
```
1 - BIU PCI Configuration Parameters     5 - Service Parameters
2 - Host Adapter Info and Status         6 - Status/Counters Info
3 - Adapter Revision Levels              7 - Link Status
4 - Display Configuration Data           8 - Link Attention
```

5. Select 3, Adapter Revision Levels . If there are multiple host adapters, specify a list of numbers from 1 – 3 separated by spaces, or use a '–' between two numbers to specify a range of host adapters. The following type of information is displayed for the host bus adapter (this is an example only).


Chipset Revision Levels:
DragonFly Revision = 0x1002106D
Firmware Revision Levels:
Current Operational Firmware = Initial Operational Firmware
Kernel Revision = 1.00
Initial Operational Firmware Revision = Initial Load 1.01a0
(QS1.01A0)
SLI-1 Revision = SLI-1 Overlay 1.01a0 (Q1F1.01A0)
SLI-2 Revision = SLI-2 Overlay 1.01a0 (Q2F1.01A0)

Version 1 shows a chipset revision that contains 210 near the end of the adapter's hex number (DragonFly Revision number).

Version 2 shows a chipset revision that contains 250 near the end of the adapter's hex number.

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Using the UNIX-based Utility

1. Enter the appropriate command to start the lputil utility:

```
For AIX enter:     /usr/lpp/diagnostics/lputil
For HP-UX enter:   /opt/lpfc/bin/lputil
For Linux enter:   /usr/sbin/lpfc/lputil
For Solaris PCI bus enter: /usr/sbin/lpfc/lputil
```

   The main menu is displayed.

```
LightPulse Common Utility version 1.1  (3/17/99)
Copyright (c) 1999, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 1
Host Adapter 0 is an LP7K (Ready Mode)

MAIN MENU

 1. List Adapters
 2. Adapter Information
 3. Firmware Maintenance
 4. Reset Adapter

 0. Exit

Enter Choice =>
```

2. Select 2, Adapter Information. The Adapter Information Menu is displayed.

```
1. BIU PCI Configuration Parameters
2. Adapter Revision Levels
3. Wakeup Parameters
4. IEEE Address
5. Loop Map
6. Status & Counters
7. Link Status
8. Configuration Parameters


0. Return to Main Menu.
```


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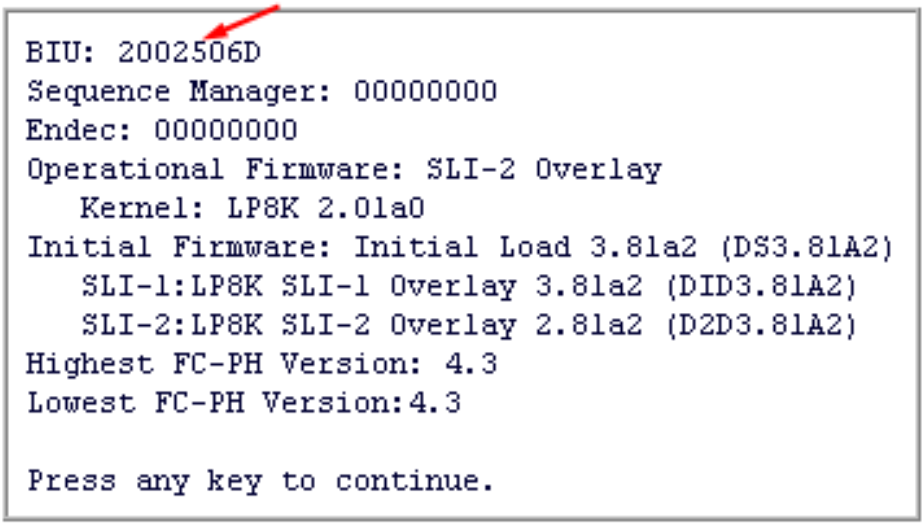
3. Select 2, Adapter Revision Levels. If there are multiple host adapters, a list is displayed and you need to select an adapter. The following type of information is displayed for the host bus adapter (this is an example only).



Version 1 shows a chipset revision that contains 210 near the end of the BIU number.

Version 2 shows a chipset revision that contains 250 near the end of the BIU number.

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Emulex Driver for Linux Installation Manual

Version 2.01g

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Driver Information

Prerequisites

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- SuSE Linux Enterprise Server 8 with 2.4.19 kernel
- SuSE Linux Enterprise Server 8 SP 3 with 2.4.21-138 kernel

64-bit Itanium Processor Family:

- Red Hat Enterprise Linux 2.1 Update 3 with kernel 2.4.18-e.40
- Red Hat Enterprise Linux 3.0 all kernels
- Red Hat Enterprise Linux 3.0 Update 1 with kernel 2.4.21-9.EL

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- Red Hat Enterprise Linux 3.0 Update 2 with kernel 2.4.21-15.EL
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- LP9802 (minimum firmware version 1.00a2)
- LP982 (minimum firmware version 1.81a1)
- Emulex Fibre Channel host bus adapters LP9402DC, LP9002DC, LP9002L and LP9000 (minimum firmware version 3.90a7)
- LP952L (minimum firmware version 3.92a2)
- Emulex Fibre Channel adapters LP8000 and LP8000DC
    - If your HBA has a Dragonfly chip version 2.00 or greater, use firmware version 3.90a7.
    - If your HBA has a Dragonfly chip below version 2.00, use firmware version 3.30a7.
- Emulex Fibre Channel host bus adapter LP7000E (minimum firmware version 3.21a0)

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Install the Driver

Note	The Emulex 2.01g driver adds several new configuration parameters and renames a couple of previous parameters. Do NOT replace the current lpfc.conf with lpfc.conf.c or lpfc.conf.defs or lpfc.conf from a previous release. With the 2.01g driver, all configuration parameters are set in the /etc/lpfc.conf file. There is no lpfc.conf.c or lpfc.conf.defs file present in the 2.01g release. To reuse the old configuration, you must backup the previous lpfc.conf.defs, lpfc.conf and lpfc.conf.c file and merge configuration in these files to /etc/lpfc.conf file after installing the new driver and before building the new driver. If you have a previous version of the driver installed, refer to the Updating The Driver from a Previous Version procedure and the Removing a Previous Version of the Driver section before attemping to install version 2.01g.

Note	This driver package contains the necessary tools to build a driver from source for all supported Linux distributions. These instructions are intended for users that are experienced with building and installing drivers from source into the Linux environment.

Note	The HBAnyware™ and LightPulse™ (lputil) utilities are bundled and must be installed together. Refer to the "Install the Utilities" section of the online Configuration manual for more information.

Note	Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

For this release, you must build your binary driver from the driver source directory. This directory contains all the necessary tools to build the Linux driver.

Once you install the source file, there are two ways to use the Emulex Linux driver:

- Build the driver as a module for test environments or those environments with frequent configuration changes. You can optionally include it in your loader configuration (e.g., lilo) to automatically load the driver module at startup.
- Build the driver into the kernel which will also autoload at boot time in a production environment.

Note	Emulex recommends building the driver as a module.

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Updating The Driver from a Previous Version

Note This section describes how to update a previous installation of an earlier driver with the 2.01g driver. The Emulex 2.01g driver adds several new configuration parameters and renames a couple of previous parameters. Do NOT replace the current lpfc.conf with lpfc.conf.c or lpfc.conf.defs or lpfc.conf from a previous release. With the 2.01g driver, all configuration parameters are set in the /etc/lpfc.conf file. There is no lpfc.conf.c or lpfc.conf.defs file present in the 2.01g release. To reuse the old configuration, you must backup the previous lpfc.conf.defs, lpfc.conf and lpfc.conf.c file and merge configuration in these files to /etc/lpfc.conf file after installing the new driver and before building the new driver.

To update a previous version of the lpfc driver:

1. Backup the old lpfc.conf.c file, lpfc.conf file and lpfc.conf.defs file by executing the following commands:

```
cd <old_install_source_directory>
cp lpfc.conf.defs /tmp/lpfc.conf.def
cp lpfc.conf.c /tmp/lpfc.conf.c
cp lpfc.conf /tmp/lpfc.conf
```

2. Remove the old driver installation as described in the Remove Previous Driver section of this manual.

3. Install the new driver as described in the appropriate installation instructions in this manual.

4. If you want to reuse the old configuration, merge the old configuration files saved in /tmp/lpfc.conf.c, /tmp/lpfc.conf and /tmp/lpfc.conf.defs to the /etc/lpfc.conf file. The parameters listed below are different in 2.01g release. All other parameters in /etc/lpfc.conf are identical to the ones in /tmp/lpfc.conf.def or /tmp/lpfc.conf.c or /tmp/lpfc.conf.

    - lpfc_log_verbose parameter has new bit field added to control logging ioctl events.

    - lpfc_fcp_bind_method is a new parameter.

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- lpfc_scan_down can only have 0 or 1 values in 2.01g drivers. If you have a value other than 0 or 1 for lpfc_scan_down in the prior installation, you must set lpfc_fcp_bind_method parameter in the 2.01g driver accordingly. Refer to the parameter description section in the online Configuration manual for detailed descriptions of the lpfc_fcp_bind_method and lpfc_scan_down parameters.

- lpfc_automap can only have 0 or 1 values in 2.01g drivers. If you have a value other than 0 or 1 for lpfc_automap in the old installation, you must set lpfc_fcp_bind_method parameter in the 2.01g driver accordingly. Refer to the parameter description section in the online Configuration manual for detailed descriptions of the lpfc_fcp_bind_method and lpfc_automap parameters.

- lpfc_fcpfabric_tmo has been renamed to lpfc_extra_io_tmo.

- lpfc_discovery_threads is a new parameter.

- lpfc_fdmi_on is a new parameter.

- lpfc_nodev_tmo now defaults to 30 seconds instead of 0.

- lpfc_num_iocbs now defaults to 256 instead of 1024.

- lpfc_num_bufs now defaults to 128 instead of 1024.

- lpfc_cr_count now defaults to 1 instead of 0.

5. Build the new driver as described in the appropriate build procedure section of this manual.

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Removing a Previous Version of the Driver

Note	This section describes how to remove a previous installation of an earlier driver. The Emulex 2.01g driver adds several new configuration parameters and renames a couple of previous parameters. Do NOT replace the current lpfc.conf with lpfc.conf.c or lpfc.conf.defs or lpfc. conf from a previous release. With the 2.01g driver, all configuration parameters are set in the /etc/lpfc.conf file. There is no lpfc.conf.c or lpfc.conf.defs file present in the 2.01g release. To reuse the old configuration, you must backup the previous lpfc.conf.defs, lpfc.conf and lpfc.conf.c file and merge configuration in these files to /etc/lpfc.conf file after installing the new driver and before building the new driver.
Note	Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf. defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

If the driver is installed as a module, do the following to remove the existing driver:

1. Shutdown all applications using storage connected through the lpfcdd driver.
2. Unmount all the file systems mounted through lpfcdd.
   - If the IP interface of the lpfndd driver is used, shutdown all the lpfndd IP interfaces using following command:

     ```
     ifconfig lpfn<n> down
     ```

   - Remove the lines in /etc/modules.conf file containing lpfcdd or lpfndd.
   - Remove the lpfcdd and lpfndd modules by executing:

     ```
     rmmod lpfcdd
     rmmod lpfndd
     rm /lib/modules/<kernel-version>/kernel/drivers/scsi/lpfcdd.o
     rm /lib/modules/<kernel-version>/kernel/drivers/scsi/lpfndd.o
     ```

   - If the IP interface is used, remove the IP interface configuration files by executing the following command:

     ```
     rm /etc/sysconfig/network-scripts/ifcfg-lpfn*
     ```


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If the lpfc and lpfndd driver is installed into the kernel source tree, use the following procedure to remove the lpfc driver from the kernel source tree:

1. Edit /usr/src/linux/drivers/Makefile to remove the following line if it is present:

```
subdir-$(CONFIG_SCSI_LPFC) += scsi/lpfc
```

2. Edit /usr/src/linux/drivers/scsi/config.in file to remove the following line if it is present:

```
dep_tristate 'Emulex LightPulse Fibre Channel support' CONFIG_SCSI_LPFC $CONFIG_SCSI
```

3. Edit /usr/src/linux/drivers/scsi/Makefile to remove the following line if it is present:

```
obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o
```

4. Edit /usr/src/linux/drivers/net/config.in file to remove the following line if it is present:

```
dep_tristate 'Emulex LightPulse Fibre Channel support' CONFIG_NET_LPFC $CONFIG_SCSI
```

5. Edit /usr/src/linux/drivers/net/Space.c to remove the following lines if they are present:

```
#ifdef CONFIG_NET_LPFC
extern int lpfn_probe(void);
static int lpfnif_probe(struct net_device *dev)
{
lpfn_probe();
return 1;
}
#endif
```

6. Edit /usr/src/linux/drivers/net/Space.c to remove the following lines if they are present:

```
#ifdef CONFIG_NET_LPFC
static struct net_device lpfn_dev = {
"lpfn", 0, 0, 0, 0, 0, 0, 0, 0, NEXT_DEV, lpfnif_probe};
# undef NEXT_DEV
# define NEXT_DEV (&lpfn_dev)
#endif
```

7. If the driver is statically linked to the current kernel, rebuild the kernel and reboot with the new kernel image.

Remove the old driver installation files as follows:

1. If the driver is installed from a tar file, execute Remove.sh in the old installation directory to remove all of the installed files.

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2. If the driver is installed from an rpm, execute the following commands to remove files installed by the rpm install.

```
rpm -e <rpm-name>
```

3. If the driver was installed in the kernel source tree, execute the following command to remove the lpfcdd driver files from the kernel source tree.

```
rm -rf /usr/src/linux/drivers/scsi/lpfc/*
```


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Install the Driver Source Files (General)

Note Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

To install the driver and boot the system, you must be running as root.

1. The kernel-source RPM must be installed. Verify by entering:

```
# rpm -a -q | grep kernel
```

   - If the kernel-source RPM is not installed, install from the OS CD by entering:

```
# rpm -i kernel-source*
```

2. By default, the driver looks for the kernel source under /usr/src/linux. This directory generally points to the kernel source tree that is currently running. If the kernel source resides under a non-standard directory, you must use the -prefix option when installing the rpm and you must change the BASEINCLUDE variable in Makefile to point to the correct place. It is recommended to use /usr/src/linux or create a symbolic link to your kernel source directory as follows:

   - If the kernel source resides in /usr/src/<kernelsource>, link it to /usr/src/linux by entering:

```
# ln -sf /usr/src<kernelsource> /usr/src/linux
```

     A directory listing similar to the following displays:

```
lrwxrwxrwx 1 root root 11 Aug 2 13:51 linux -> linux-2.4.4
drwxr-xr-x 14 1046 101 4096 Aug 2 13:51 linux-2.4.4
```

   - Or change the BASEINCLUDE variable in Emulex's Makefile to point to the correct place and use the -prefix option on the RPM installation. For example:

```
BASEINCLUDE = /usr/src/<kernelsource>
```


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Install the Driver Source Files (SuSE)

Note Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

To install the driver and boot the system, you must be running as root.

1. Install the accompanied kernel source from the SuSE distribution CD using either "yast" or "yast2".
2. If the kernel source resides in /usr/src/<linux.version.manufacturer>, link it to /usr/src/linux by entering:

```
# ln -sf /usr/src/<linux.version.SuSE> /usr/src/linux
```

3. To ensure version synchronization between driver and kernel type:

```
# cd /usr/src/linux
# make mrproper
# make cloneconfig
# make dep
```


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Install the Driver Using a Tar File

Note Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

To install the driver and boot the system, you must be running as root.

1. Create a temporary directory (for example, emlxtemp).

   ```
   # mkdir emlxtemp
   ```

2. Change directory to the temporary directory.

   ```
   # cd emlxtemp
   ```

3. Depending on the version of the gcc compiler on your system, copy or download the corresponding device driver file to the temporary directory.

4. Untar the driver file, enter this command:

   ```
   # tar -xvf <filename.tar>
   ```

5. Type:

   ```
   # cd lpfc-<driver_version>
   ```

   - If you want to install the driver as a module, then this directory is the driver_installation_directory.
   - If you want to install the driver as part of the kernel, then copy everything under this directory to your new driver_installation_directory under /usr/src/<kernelsource>/driver/scsi/lpfc. Type:

     ```
     # find . -print|cpio -pdumv  /usr/src/<kernelsource>/driver/scsi/lpfc
     ```

6. Execute the install script Install.sh by entering the following command in the driver_installation_directory.

   ```
   # sh Install.sh
   ```

   This will install the lpfc.conf file in the appropriate directory.

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Install the Driver Using an RPM File

Note Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

If you are installing and uninstalling the Linux driver using the RPM file, do not use install.sh and remove.sh.

To install the driver and boot the system, you must be running as root.

1. Create a temporary directory (for example, emlxtemp).

```
# mkdir emlxtemp
```

2. Change directory to the temporary directory.

```
# cd emlxtemp
```

3. Depending on the version of the gcc compiler on your system, copy or download the corresponding device driver RPM file to the temporary directory.

4. To install the rpm type:

```
# rpm -i <filename.rpm>
```

Note By default the source files will be installed in /usr/src/linux/drivers/scsi/lpfc directory. Use -prefix option to indicate an alternate driver installation directory. This directory becomes your driver_installation_directory.

To verify the RPM installation was successful, the following command will list the rpm_name:

```
# rpm -a -q | grep lpfc
```

To remove the rpm type:

```
# rpm -e <rpm_name>
```


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Build the Driver as a Module

Once you have installed the source file, you can build the driver as a module.

> **Note** We recommend building the driver as a module as opposed to building the driver into the kernel.

> **Note** Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

1. At the shell prompt type:

```
cd driver_istallation_directory
```

2. At the shell prompt, edit /etc/lpfc.conf to reflect your desired configuration.

> **Note** You must change the lpfc_network_on configuration parameter to 1 in the /etc/lpfc.conf file if you plan to use the network interface. See the online Configuration Manual for details.

3. Build the drivers. Type:

```
# make
```

This makes the driver files similar to the following:

```
-rw-r--r-- 1 root root 226200 Aug 13 10:33 lpfcdd.o
-rw-r--r-- 1 root root 3334 Aug 13 10:33 lpfndd.o
```

4. Install both drivers under /lib/modules/kernel_version. Type:

```
# make install
```


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Load the Driver

Before attempting to load the driver you can test the driver.

To test the driver type:

```
# insmod lpfcdd
# insmod lpfndd
```

- **lpfcdd** - main driver, SCSI functionality, FCP support, diagnostic support
- **lpfndd** - IP support (this driver is dependent on lpfcdd being loaded first)

> **Note** If the system does not have a SCSI driver loaded or built into the kernel, enter the following before loading lpfcdd:
> # insmod scsi_mod
> # insmod sd_mod

Load the driver through the RAM disk image

To load the driver:

1. To add SCSI and IP modules, edit /etc/modules.conf.
2. Add the following line to add a SCSI module:

   ```
   alias scsi_hostadapter lpfcdd
   ```

3. Add the following line to add an IP module:

   ```
   alias lpfnX lpfndd
   ```

   where ***X*** is the interface number, 0 through 31.

   > **Note** If you want to configure SCSI only, just add the scsi_hostadapter line. The IP module is dependent on the SCSI modules being there, so you cannot configure just IP.

4. Run the following command to update your system with the information you added to /etc/modules.conf:

   ```
   # depmod -a
   ```

5. For IP support, edit /etc/sysconfig/network-scripts/ifcfg-lpfnX. Where X is the interface number, 0 through 7. This file should be created if you wish to configure IP.

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An example of this file:

```
DEVICE=lpfn0
IPADDR=138.239.40.6
BROADCAST=138.239.40.255
NETWORK=138.239.40.0
NETMASK=255.255.255.0
ONBOOT=yes
```

6. Edit /etc/grub.conf to specify boot / startup parameters. It's a good idea to keep a boot image record that is known to be good, so you can boot the system in case of problems. A boot image record consists of lines between "title" entries. An example of a default /etc/grub.conf:

```
      # grub.conf generated by anaconda
      # Note that you do not have to rerun grub after making changes to
this file
      # NOTICE:  You have a /boot partition.  This means that
      #          all kernel and initrd paths are relative to /boot/,
eg.
      #          root (hd0,0)
      #          kernel /vmlinuz-version ro root=/dev/sda2
      #          initrd /initrd-version.img
      #boot=/dev/sda
         default=1
         timeout=10
         splashimage=(hd0,0)/grub/splash.xpm.gz
         title Red Hat Enterprise Linux AS (2.4.21-4.ELsmp)
                 root (hd0,0)
                 kernel /vmlinuz-2.4.21-4.ELsmp ro root=LABEL=/
                 initrd /initrd-2.4.21-4.ELsmp.img
         title Red Hat Enterprise Linux AS-up (2.4.21-4.EL)
                 root (hd0,0)
                 kernel /vmlinuz-2.4.21-4.EL ro root=LABEL=/
                 initrd /initrd-2.4.21-4.EL.img
```

7. Do the following:

   - The following lines should be appended to the end of the file to add a new boot record for the driver:

     ```
     title New Title (new_label)
     root (hd0,0)
     kernel /vmlinuz-kernel_version ro root=LABEL=/
     initrd/new_image_name
     ```

     Where "New Title" is a title you choose, "new_label" is usually the kernel version, "vmlinuz-kernel_version" is the name of the kernel file and location to load, and "new_image_name" is the name of the initial RAM disk being created with mkinitrd.

     See the man pages for grub and grub.conf for more information.

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- Verify if SCSI functionality is loaded as a module by using the following command:

```
lsmod
```

  - If scsi_mod and sd_mod are listed in the output, add the following line to the modules.conf file:

```
options scsi_mod max_scsi_luns=255 scsi_allow_ghost_devices=1
```

  - If scsi_mod and sd_mod are not listed in the output of the lsmod command, modify the kernel line of the new boot record in the grub.conf file:

```
kernel /vmlinuz-kernel_version ro root=LABEL=/ max_scsi_luns=255 scsi_allow_ghost_devices=1
```

    Below is an example of the grub.conf entry if SCSI functionality is built into the kernel.

```
title Red Hat Linux with Emulex driver (2.4.21-4.ELsmpl)
root (hd0,0)
kernel /vmlinuz-2.4.21-4.ELsmp ro root=LABEL=/ max_scsi_luns=255
scsi_allow_ghost_devices=1
initrd /initrd-2.4.21-4.ELsmp-elx.img
```

Note The lpfc_skip_luns parameter located in the/etc/lpfc.conf file must be set to 1 when the driver is built.

8. The boot image new_image_name must match the name specified in the /etc/grub.conf file. Run the following command to build the boot image:

```
# /sbin/mkinitrd -f  /boot/new_image_name `uname -r`
```

9. Reboot the system to incorporate the new driver. At the shell prompt, type the following:

```
# sync
# reboot
```

10. As the system reboots, you are prompted with GRUB boot. At this point enter the name of the label of your boot image, new_label in the above example, or just press enter and the default boot image will be loaded.

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Install The Driver into Ramdisk (Red Hat)

Follow these instructions to add the driver module into the initial RAM disk image for Red Hat systems.

1. Build the driver as a module. Refer to the "Build the Driver as a Module" topic in this manual for instructions.

2. Create the new boot image.

   For ia64 systems type:

   ```
   # /sbin/mkinitrd -f /boot/efi/efi/redhat/initrd-<kernelversion>.img <kernelversion>
   ```

   Where kernelversion is the version number being returned by the `uname -r` command.

   For all other architectures type:

   ```
   # /sbin/mkinitrd -f /boot/initrd-<kernelversion>.img <kernelversion>
   ```

   Where kernelversion is the version number being returned by the `uname -r` command.

3. Reboot the system.

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Install The Driver into Ramdisk (SuSE SLES-8)

Follow these instructions to add the driver module into the initial RAM disk image for SuSE Linux Enterprise Server 8 systems.

1. Build the driver as a module. Refer to the "Build the Driver as a Module" topic in this manual for instructions.

2. Build the new boot image (initrd) with support for the Emulex driver. Type:

```
# cd /etc/sysconfig
# vi kernel
```

3. Edit the line that reads "INITRD_MODULES =" to add the lpfcdd module. For example,

```
INITRD_MODULES="mptscsih reiserfs"
```

   Should look like the following:

```
INITRD_MODULES="mptscsih reiserfs lpfcdd"
```

4. Save and close the file.

5. Create the new boot image. Type:

```
# /sbin/mkinitrd -i /boot/initrd-<kernversion> -k /boot/vmlinuz-<kernversion>
```

   Where kernversion is the kernel version number being returned by the `uname -r` command.

6. Reboot the system.

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Build the Driver Into the Kernel

Configure SCSI Functionality

Once you have installed the source files, you can build the driver into the kernel.

> **Note** We recommend building the driver as a module as opposed to building the driver into the kernel.

> **Note** Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

1. Change to the driver installation directory. Type:

```
cd_driver_installation_directory
```

2. Edit the /etc/lpfc.conf file and BASEINCLUDE variable in Makefile, if needed. See Build the Driver as a Module for details.

3. Change to the Linux source directory:

```
# cd /usr/src/linux/
or
/usr/src/<kernelsource>
```

4. Edit Rules.make and remove $(sort and the matching closing parenthesis from this line:

```
subdir-list = $(sort $(patsubst  %,_subdir_%,$(SUB_DIRS)))
```

   The edited line should now display as follows:

```
subdir-list = $(patsubst %,_subdir_%,$(SUB_DIRS))
```

   > **Note** For some 2.4 based kernels, this will allow the scsi/lpfc Makefile to be invoked BEFORE the scsi Makefile.

5. Edit the Makefile under the drivers directory:

```
# cd /usr/src/linux/drivers
or
/usr/src/<kernelsource>/drivers
```

   Before $(CONFIG_SCSI) adds scsi to the directory lists, add a check for $(CONFIG_SCSI_LPFC) to add scsi/lpfc to the directory lists. The scsi/lpfc Makefile

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should be invoked BEFORE the scsi Makefile. Edit the following lines:

```
subdir-$ (CONFIG_IDE) += ide
subdir-$ (CONFIG_SCSI) += scsi
```

Add the following line:

```
subdir-$ (CONFIG_SCSI_LPFC) += scsi/lpfc
```

The edited lines should look like the following:

```
subdir-$ (CONFIG_IDE) += ide
subdir-$ (CONFIG_SCSI_LPFC) += scsi/lpfc
subdir-$(CONFIG_SCSI) += scsi
```

6. Go to the scsi directory:

```
# cd /usr/src/linux/drivers/scsi
or
/usr/src/kernelsource/drivers/
scsi
```

7. Edit Config.in and locate the following lines (the lines may wrap):

```
dep_tristate 'EATA-
PIO [old DPT PM2001, PM2012A] support' CONFIG_SCSI_EATA_PIO $CONFIG_SCSI
dep_tristate 'Future Domain 16xx sCSI/AHA-
2920A support' CONFIG_SCSI_FUTURE_DOMAIN $CONFIG_SCSI
```

Add the following line (in alphabetical order):

```
dep_tristate 'Emulex LightPulse Fibre Channel support' CONFIG_SCSI_LPFC $CONFIG_SCSI
```

The edited lines should now look like the following (the lines may wrap):

```
dep_tristate 'EATA-
PIO [old DPT PM2001, PM2012A] support' CONFIG_SCSI_EATA_PIO $CONFIG_SCSI
dep_tristate 'Emulex LightPulse Fibre Channel support' CONFIG_SCSI_LPFC $CONFIG_SCSI
dep_tristate 'Future Domain 16xx SCSI/AHA-
2920A support' CONFIG_SCSI_FUTURE_DOMAIN $CONFIG_SCSI
```


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8. Edit Makefile and add (with other CONFIG_SCSI_devices) a check for $(CONFIG_SCSI_LPFC). Add the following lines

```
obj-$(config_SCSI_LPFC) += lpfcdd.o
```

Warning The order in which the drivers will be loaded at boot time follows the order in which they appears in this Makefile. If your system already contains a SCSI adapter or a Fibre Channel adapter, the system will attempt to boot from the first device found on the first adapter for which a driver is loaded. The boot will therefore fail if this is not the right boot device or no device is found.

9. Boot from the Emulex adapter. Make sure the line obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o appears before the other adapter driver in this Makefile. For example:

```
obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o
obj-$(CONFIG_SCSI_AHA1740) += aha1740.o
```

10. Boot from another SCSI or Fibre Channel adapter. Make sure the line obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o appears after the other adapter driver. For example:

```
obj-$(CONFIG_SCSI_AHA1740) += aha1740.o
obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o
```

Note For SLES8/SP3 RC4 some portions of the above modifications have already been committed to the kernel tree. However there might be a conflict with some of these modifications. In case of a conflict, it is recommended that you use these changes. For example in SLES8/SP3 RC4, in drivers/scsi/Makefile you must replace:

```
obj-$(CONFIG_SCSI_LPFC) += /lpfc/lpfcdd.o /lpfc/lpfndd.
o
With
obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o
```

If you want to include Emulex's IP functionality in the kernel, continue on to the "Configure IP Functionality" section.

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Build the Driver Into the Kernel

> **Note** Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

Configure IP Functionality

> **Note** If you are building the driver and want to include IP functionality, you must set the lpfc_network_on parameter to "1". See the Configuration manual for more details.

1. Do the following:

```
# cd /usr/src/linux/drivers/net
or
/usr/src/kernelsource/drivers/
net
```

2. Edit Config.in. Edit the following lines:

```
bool 'Fibre Channel driver support' CONFIG_NET_FC
if ["$CONFIG_NET_FC" = "y" ]; then
  dep_tristate' Interphase 5526 Tachyon chipset based adapter support' CONFIG_IPHASE5526 $CONFIG_SCSI
$CONFIG_PCI
fi
```

3. Add the following line (all one line):

```
dep_tristate ' Emulex LightPulse Fibre Channel support' CONFIG_NET_LPFC $CONFIG_SCSI $CONFIG_PCI
```

   The edited lines should now look like the following:

```
bool 'Fibre Channel driver support' CONFIG_NET_FC
if ["$CONFIG_NET_FC" = "y" ]; then
dep_tristate' Interphase 5526 Tachyon chipset based adapter support' CONFIG_IPHASE5526 $CONFIG_SCSI
$CONFIG_PCI
dep_tristate ' Emulex LightPulse Fibre Channel support' CONFIG_NET_LPFC $CONFIG_SCSI
fi
```

3. Locate the following text in Space.c:

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```
#ifdef CONFIG_NET_FC
static int fcif_probe(struct net_device *dev)
{
if (dev->base_addr == -1)
return 1;
if (1
#ifdef CONFIG_IPHASE5526
&& iph5526_probe(dev)
#endif
&& 1 ) {
return 1; /* -ENODEV or -EAGAIN would be more accurate. */
}
return 0;
}
#endif /* CONFIG_NET_FC */
```


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4. Add this text after #ifdef CONFIG_NET_FC:

```
extern int lpfn_probe (void);
static int lpfnif_probe(struct net_device *dev)
{
 lpfn_probe();
 return 1;
}
#endif
```

The edited lines should now look like the following:

```
#ifdef CONFIG_NET_FC
#ifdef CONFIG_NET_LPFC
extern int lpfn_probe(void);
static int lpfnif_probe(struc net_device * dev)
{
 lpfn_probe();
 return 1;
}
#endif

static int fcif_probe(struct net_device *dev)
{
if (dev->base_addr == -1)
return 1;
if (1
#ifdef CONFIG_IPHASE5526
&& iph5526_probe(dev)
#endif
&& 1 ) {
return 1; /* -ENODEV or -
EAGAIN would be more accurate. */
}
return 0;
}
#endif /* CONFIG_NET_FC */ }
```

5. Locate the following lines:

```
#ifdef CONFIG_NET_FC
static struct net_device fc1_dev = {
"fc1", 0, 0, 0, 0, 0, 0, 0, 0, 0, NEXT_DEV,  fcif_probe};
static struct net_devicev fc0_dev = {
"fc0", 0, 0, 0, 0, 0, 0, 0, 0, 0, &fc1_dev, fcif_probe};
# undef NEXT_DEV
# define NEXT_DEV (&fc0_dev)
#endif
```

6. Add these lines after: # define NEXT_DEV (&fc0_dev):

```
#ifdef CONFIG_NET_LPFC
static struct net_device lpfn_dev = {
"lpfn", 0, 0, 0, 0, 0, 0, 0, 0, 0, NEXT_DEV, lpfnif_probe};
# undef NEXT_DEV
# define NEXT_DEV (&lpfn_dev)
#endif
```


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The edited lines should look like the following:

```
#ifdef CONFIG_NET_FC
static struct net_device fc1_dev = {
"fc1", 0, 0, 0, 0, 0, 0, 0, 0, 0, NEXT_DEV, fcif_probe};
static struct net_device fc0_dev = {
"fc0", 0, 0, 0, 0, 0, 0, 0, 0, 0, &fc1_dev, fcif_probe};
# undef NEXT_DEV
# define NEXT_DEV (&fc0_dev)
#ifdef CONFIG_NET_LPFC
static struct net_device lpfn_dev = {
"lpfn", 0, 0, 0, 0, 0, 0, 0, 0, 0, NEXT_DEV,  lpfnif_probe};
# undef NEXT_DEV
# define NEXT_DEV (&lpfn_dev)
#endif /* CONFIG_NET_LPFC */
#endif
```

Note For SLES8/SP3 RC4 some portions of the above modifications have already been committed to the kernel tree. However there might be a conflict with some of these modifications. In case of a conflict, it is recommended that you use these changes. For example in SLES8/SP3 RC4, in drivers/scsi/Makefile you must replace:

```
obj-$(CONFIG_SCSI_LPFC) += /lpfc/lpfcdd.o /lpfc/lpfndd.
o
With
obj-$(CONFIG_SCSI_LPFC) += lpfcdd.o
```


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Build the Kernel and Modules

Note Driver installation or removal does not save the configuration files (i.e. lpfc.conf, lpfc.conf.c or lpfc.conf.defs) from previous installations. If you customized any of these files, we recommend that you copy them to a another location so that you have a record of the changes.

1. Follow the normal procedures for building the Linux kernel and modules and include all Emulex LightPulse Fibre Channel support:

```
# cd /usr/src/linux   or   cd /usr/src/<kernelsource>
# make mrproper
# make menuconfig
```

2. If you want to include Emulex's SCSI functionality in the kernel, select 'Emulex LightPulse Fibre Channel support' under 'SCSI support' / 'SCSI low level drivers'. You can select (M) module support or (*) Build into kernel.

3. If you want to include Emulex's IP functionality in the kernel, select 'Fibre Channel driver support' / 'Emulex LightPulse Fibre Channel support' under Network device support. When running with IP, you must select the same option as step 2: (M) module support or (*) Build into kernel.

4. Select any other options that may be required.

```
# make dep
# make clean
```

5. For i386 systems:

```
# make bzImage
cp arch/i386/boot/bzImage/boot/vmlinuz-
kernel_version
```

   For IA64 systems:

```
# make vmlinux
# cp vmlinux /boot/efi/
<image_name>
```

6. Build modules:

```
# make modules
# make modules_install
```

7. If you select (M) module support in steps 2 or 3, edit /etc/modules.conf

   Add the following line to add a SCSI module:

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```
alias scsi_hostadapter lpfcdd
```

Add the following line to add an IP module:

```
alias lpfnX lpfndd
```

where X is the interface number, 0 through 7.

Note If you want to configure SCSI only, just add the scsi_hostadapter line. The IP module is dependent on the SCSI modules being there, so you cannot configure just IP.

8. Edit /etc/grub.conf to reflect the new kernel and run mkinitrd as explained in the procedure for Building the Driver as a Module

9. Reboot with the new kernel.

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Using lpfcdd as the Boot Device

It is possible to use a device, connected to the lpfcdd driver, as the boot device. The only restriction is you must be booted off an existing SCSI or IDE boot / root device.

1. Prepare the boot image (note the use of --preload to load lpfcdd before other modules). Type:

```
/sbin/mkinitrd --preload lpfcdd /boot/new.img < kernelversion>
```

2. Create a boot floppy. Insert a floppy disk into the drive. Type:

```
/sbin/mkbootdisk <kernelversion>
mount /mnt/floppy
cp /boot/new.img  /mnt/floppy/initrd.img
```

3. Identify the Fibre Channel device that you wish to use as the boot/root device, /dev/sdX. Create partitions and make file systems on the Fibre Channel boot drive. Type:

```
fdisk  /dev/sdX
  Device Boot    Start    End     Blocks    ID   System
/dev/sdX1         1        4      32098+   83   Linux    <==+25M
/dev/sdX2         5        13      72292+  82   Linux swap     <==+64M
/dev/sdX3        14      1106   8779522+  83   Linux       <==end of device

mkfs.ext2  /dev/sdX1
mkfs.ext2  /dev/sdX3
mkswap  /dev/sdX2
mount  /dev/sdX1  mnt0
mount  /dev/sdX3  mnt1
```


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4. Copy the file system from the running system (you can use any other procedure to copy the system). Type:

```
cd  /
tar cf - ./bin ./dev/ ./etc ./lib ./misc ./mnt ./root ./sbin ./tmp ./usr ./var ./home  |  (cd /mnt1;
tar xf -)
cd /boot
tar cf . |  (cd  /mnt0\tar xf -)
cd /mnt1
mkdir boot proc home
```

5. Modify fstab on the Fibre Channel boot disk (you can keep old SCSI drives in fstab, just change their devs to the correct ones and mkdir their mount points). Type:

```
cd /mnt1/etc
```

   Edit fstab, change to:

```
/dev/sdX3      /              ext2    defaults                1  1
/dev/sdX1      /boot          ext2    defaults                1  2
/dev/sdX2      swap           swap    defaults                1  0
/dev/fd0       /mnt/floppy    ext2    noauto,owner            0  0
.
.                          <==other drives (CD for example)
.
               /proc          proc    defaults                0  0
               /dev/pts       devpts  gid=5,mode=620         0  0
```

6. Boot using the floppy created in step 2. At the LILO boot prompt, type:

```
linux root=/dev/sdX3
```

   From this point on, you are dealing with the Fibre Channel boot disk.

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7. Modify /etc/grub.conf as follows:

```
boot=/dev/sdX
map=/boot/map
install=boot/boot.b
prompt
timeout=50
default=linux

image=/boot/vmlinuz-2.2.12-20     <==whatever kernel version you are using
    label=linux
    initrd=/boot/new.img
    read-only
    root=/dev/sdX3
```

8. Reboot without the floppy. If another SCSI adapter BIOS starts before Emulex's BIOS, this adapter must be disabled. Otherwise, the lpfcdd module will be loaded first and the other SCSI adapter will be loaded second.

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Install Red Hat Enterprise Linux onto a Fibre Channel Boot Disk

Please follow these instructions if you want to install Red Hat Enterprise Linux onto a Fibre Channel boot disk attached to Emulex LightPulse HBA.

1. Download the Driver Disk image file appropriate to your Red Hat distribution. An example of this is:

   ```
   as21-i586-2.01g.img.gz
   ```

2. Uncompress the Driver Disk image file if necessary.

   ```
   # gunzip as21-i586-2.01g.img.gz
   ```

3. Insert a diskette into the diskette drive and copy the uncompressed Driver Disk image file to diskette.

   ```
   # dd if=as21-i586-2.01g.img of=/dev/fd0 bs=1440k
   ```

4. Boot the system to be installed from either CD-ROM disc 1 or the Red Hat boot diskette.

   - For i386 systems, at the boot: prompt, type "linux dd" and press ENTER.
   - For IA64 systems, switch to the appropriate file system to which the Installation CD-ROM disc 1 is mapped. This can be done in the EFI shell by typing in the name assigned to the Installation CD-ROM disc 1. Now type in "elilo linux dd" and press ENTER.

5. Select YES, when you are prompted:

   ```
   Do you have a driver disk?
   ```

6. You will then be prompted:

   ```
   Insert your driver disk and press "ok" to continue
   ```

7. Insert the driver disk and press ENTER.

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Red Hat will print a message indicating it is loading the lpfc driver. You can then install RedHat following the standard installation directions from Red Hat.

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Install SuSE Enterprise Server 8.0 (SuSE SLES-8) onto a Fibre Channel Boot Disk

Please follow these instructions if you want to install SuSE Enterprise Server 8 onto a Fibre Channel boot disk attached to Emulex LightPulse HBA.

1. Download the Emulex Driver Disk image file appropriate to your SuSE distribution. For example:

   ```
   sles8-i586-2.01g.img.gz
   ```

2. Uncompress the Driver Disk image file if necessary.

   ```
   # gunzip sles8-i586-2.01g.img.gz
   ```

3. Insert a diskette into the diskette drive and copy the uncompressed Driver Disk image file to diskette.

   ```
   # dd if=sles8-i586-2.01g.img of=/dev/fd0 bs=1440k
   ```

4. Boot the system to be installed from CD-ROM disc 1.

5. At the intial screen, press the alt key. When you are prompted to to have the driver disk ready, press ENTER.

6. You will then be prompted to insert the driver disk. Insert the disk into the floppy drive, and then press ENTER.

   The Yast2 installation process will continue. You will have the option of selecting one of the fibre-channel attached disks as the installation target. You can then install SuSE SLES-8 by following the standard installation directions from Yast2.

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Install the Utilities

Please follow these instructions to install HBAnyware and lputil on your system. For ease of installation, HBAnyware and lputil are bundled together.

Prerequisites

- lpfcdriver 2.01g must be installed prior to installing the utilities
- Java Runtime Environment

  Version 1.4 or later of the Java Runtime Environment (JRE) must be installed. HBAnyware will not run under earlier versions of the JRE.

  The JRE and instructions for installation can be found at http://java.sun.com/downloads/index.html

Installing the Utilities from the Tar File

1. Copy the <HBAnyware_version>.tgz file to a directory on the install machine.
2. cd to the directory to which you copied the tgz file.
3. Untar the file. Type:

   ```
   tar -xvfz <HBAnyware_version>.tgz
   ```

4. su to root.
5. Run the install.sh script. Type:

   ```
   ./install.sh
   ```

Installing the Utilities from the RPM File

1. Copy the <HBAnyware_version>.rpm file to a directory on the install machine.
2. su to root.

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3. Type:

```
rpm -U <HBAnyware_version>.rpm
```

Note The utilities require the java runtime binaries and libraries, so their path must be included in the PATH environment variable. For example, if the java runtime binaries are in /usr/java/bin, then include this path in the PATH environment variable.

For example: (bash> export PATH="$PATH:/usr/java/bin")

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Install the HBAnyware Security Configurator

Please follow these instructions to install the HBAnyware Security Configurator on your system.

Prerequisites

- lpfcdriver 2.01g must be installed prior to installing the utilties
- HBAnyware version 2.0a13 installed on the system
- Java Runtime Environment

  Version 1.4 or later of the Java Runtime Environment (JRE) must be installed. lputil and HBAnyware will not run under earlier versions of the JRE.

  The JRE and instructions for installation can be found at http://java.sun.com/downloads/index.html

Installing the HBAnyware Security Configurator from the Tar File

1. Copy the <HBAnyware_version>.tgz file to a directory on the install machine.
2. cd to the directory to which you copied the tgz file.
3. Untar the file. Type:

   ```
   tar -xvfz <HBAnywareSSC_version>.tgz
   ```

4. su to root.
5. Run the install.sh script. Type:

   ```
   ./install.sh
   ```

Installing the HBAnyware Security Configurator from the RPM File

1. Copy the <HBAnyware_version>.rpm file to a directory on the install machine.
2. su to root.

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3. Type:

```
rpm -U <HBAnywareSSC_version>.rpm
```


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Emulex Driver for Linux Configuration Manual

Version 2.01g

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Introduction

The Emulex driver for Linux has many options that can be modified to provide for different behavior. You can change these options using the HBAnyware™ utility or the lputil™ utility.

- The HBAnyware utility is a Java-based, user friendly graphical environment. Use HBAnyware to do any of the following:
  - Discover HBAs
  - Reset HBAs
  - Sort HBAs
  - Set up persistent binding
  - Set driver parameters
  - Update firmware on the local HBA or on remote HBAs
- The LightPulse utility (lputil) is a command-line interface. Use lputil to do any of the following:
  - Download PCI configuration data files
  - Discover HBAs
  - Reset HBAs
  - Update firmware on the local HBA
  - Update x86 BootBIOS
  - Enable the x86 BootBIOS message

Note HBAnyware's rmserver must be running on all remote hosts that are to be discovered and managed.

Remote capabilities of HBAnyware are subject to fabric zoning configuration. Remote hosts to be discovered and managed by HBAnyware must be in the same zone.

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Start HBAnyware for Linux

To start HBAnyware for Linux:

1. su to root.
2. Run the script:

```
/usr/sbin/hbanyware/hbanyware
```

To start the HBAnyware Security Configurator for Linux:

1. su to root.
2. Run the script:

```
/usr/sbin/hbanyware/ssc
```


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Use HBAnyware

The HBAnyware window contains five basic components: the menu bar, the toolbar, the discovery tree, the property tabs and the status bar.

Note The element you select in the discovery tree determines whether a menu item or toolbar icon is active. For example, if you select the local host or other system host, the Reset Adapter item on the Adapter menu is unavailable. The Reset Adapter toobar button is unavailable as well.

The Menu Bar

The menu bar contains command menus that enable you to perform a variety of tasks such as exiting HBAnyware, resetting host bus adapters and sorting items in the discovery tree view. Many of the menu bar commands are also available from the toolbar.

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The Toolbar

The toolbar contains buttons that enable you to refresh the discovery tree view, reset the selected host bus adapter and sort the discovery tree view. Many of the toolbar functions are also available from the menu bar.

The toolbar is visible by default. Use the Toolbar item in the View menu to hide the toolbar. If the item is checked, the toolbar is visible.

The Toolbar Buttons

The toolbar buttons perform the following tasks:

Click the Rediscover button to refresh the discovery tree display.

Click the Reset button to reset the selected host bus adapter.

Sort Toolbar Buttons

Discovered adapters can be sorted by host name, fabric addresses or by local HBAs. By default, adapters are sorted by host name, with local HBAs appearing first.

Sorting is performed in ascending order and recognizes letters, numbers, spaces and punctuation marks.

The Sort by Host Name button (default)

- Initially sorts by host name. Host names cannot be changed using HBAnyware. Names must be changed locally on that system.
- Within each host system, sorts by HBA model.
- If there are multiple HBAs with the same model number, the models are sorted by world wide node name.

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- If there are targets present, they are sorted by world wide port name. Multiple HBAs can reference the same target.
- If there are LUNs present, they are sorted by LUN name.

The Sort by Fabric ID button

- Initially sorts by fabric ID.
- Within each fabric ID, sorts by HBA model.
- If there are multiple HBAs that have the same model number, the models are sorted by world wide node name.
- If there are targets present, they are sorted by world wide port name. Multiple HBAs can reference the same target.
- If there are LUNs present, they are sorted by LUN name.
- If the fabric ID is all zeros, there is no fabric attachment.

The Sort by Local HBAs Only button

- Sorts by the HBA's local or remote location and is either on or off. Works in conjunction with the Sort by Host Name and Sort by Fabric ID buttons.

The Discovery Tree

The discovery tree (left pane) displays icons representing discovered network (SAN) elements (local host name, system host names and all host bus adapters that are active on each host). Targets and LUNs, when present, are also displayed.

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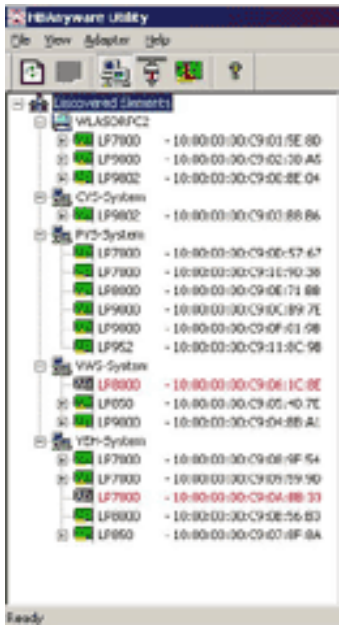

Discovery Tree Icons

Discovery tree icons represent the following:

The local host.

Other hosts connected to the system.

A green HBA icon with black descriptive text represents an HBA that is online.

A gray HBA icon with red descriptive text represents an HBA that is offline or otherwise temporarily inaccessible. Several situations could cause the HBA to be offline or inaccessible:

- The HBA on a local host is not connected to the network but is still available for local access.
- The HBA on a local host is malfunctioning and is inaccessible to the local host as well as to the network.
- The HBA on a local host is busy performing a local download and is temporarily inaccessible to the local host as well as to the network.

The Target icon represents connections to individual storage devices.

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Property Tabs

The property tabs display configuration, statistical and status information for network elements. The set of available tabs is context-sensitive, depending on the type of network element or HBA currently selected in the discovery tree.

Status Bar

As you navigate through the menu bar or the toolbar, help messages appear on the status bar near the bottom of the HBAnyware window.

The status bar is visible by default. Use the Status Bar item in the View menu to hide the status bar. If the item is checked, the status bar is visible.

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Use HBAnyware Command-Line Interface

The CLI (command-line interface) Client component of HBAnyware provides access to the capabilities of the Remote Management library from a console command prompt. This component is intended for use in scripted operations from within shell scripts, batch files, or the specific platform equivalent.

> **Note** HBAnyware must be running on all remote hosts that are to be discovered and managed.
>
> Remote capabilities of HBAnyware are subject to fabric zoning configuration. Remote hosts to be discovered and managed by HBAnyware must be in the same zone.

Using the CLI Client

The CLI Client is a console application named HBACMD. Each time you run this application from the command line, a single operation is performed.

The first parameter of this command is the requested operation. When the specified operation is completed, the command prompt is displayed. Most operations retrieve information about an entity on the SAN and display that information on the console.

Most of the CLI Client commands require one or more additional parameters that specify the nature of the command. A parameter used by many HBACMD commands specifies the World Wide Node Name of the host bus adapter (HBA) that is the target of the command. For example, the following command displays the port attributes for the HBA with the specified World Wide Node Name:

```
/usr/sbin/hbanyware/hbacmd portattrib 10:00:00:00:c9:20:20:20
```

CLI Client Command Reference

Version

Syntax	`./hbacmd VERSION`
Description	The current version of the HBAnyware CLI Client application.
Parameters	N/A

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List HBAs

Syntax	`./hbacmd LISTHBAS`
Description	A list of the discovered manageable Emulex HBAs and their World Wide Node Names.
Parameters	N/A

Display HBA Attributes

Syntax	`./hbacmd HBAAttrib <wwnn>`	
Description	A list of attributes for the HBA with the specified World Wide Node Name.	
Parameters	wwnn	The World Wide Node Name of the HBA. The HBA can be either local or remote.

Port Attributes

Syntax	`./hbacmd PortAttrib <wwpn>`	
Description	A list of attributes for the port with the specified World Wide Port Name.	
Parameters	wwpn	The World Wide Port Name of the port. This port can be either local or remote.

Port Statistics

Syntax	`./hbacmd PortStat <wwpn>`	
Description	A list of statistics for the port with the specified World Wide Port Name.	
Parameters	wwpn	The World Wide Port Name of the port. The port can be either local or remote.

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Server Attributes

Syntax	`./hbacmd ServerAttrib <nodename>`
Description	A list of attributes for the specified server.
Parameters	nodename The nodename of the server.

Download

Syntax	`./hbacmd DOWNLOAD <wwnn> <filename>`
Description	Loads the specified firmware image to the (HBA) with the specified WWNN.
Parameters	wwnn The World Wide Node Name of the HBA that is the target of the firmware download. The HBA can be either local or remote.
	filename The pathname of the firmware image that is to be loaded. This can be any file that is accessible to the CLI client application, but we recommend that you keep image files in the Emulex Repository folder or directory.

Reset Adapter

Syntax	`./hbacmd RESET <wwpn>`
Description	Resets the HBA with the specified World Wide Port Name.
Parameters	wwpn The World Wide Port Name of the port. The port can be either local or remote.

Target Mapping

Syntax	`./hbacmd TargetMapping <wwpn>`
Description	A list of mapped targets for the port with the specified World Wide Port Name.
Parameters	wwpn The World Wide Port Name of the port. The port can be either local or remote.

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Start lputil

The LightPulse Utility (lputil) is loaded automatically when the driver utilities kit is installed.

Start the utility by entering the complete path to lputil. The path reflects the default installation path. If the installation path changed, you will need to adjust the command appropriately.

```
/usr/sbin/lpfc/lputil
```


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Discover HBAs - Introduction

You can discover adapters using either HBAnyware or lputil.

- HBAnyware allows you to discover both local and remote adapters.
- lputil allows you to discover local adapters only.

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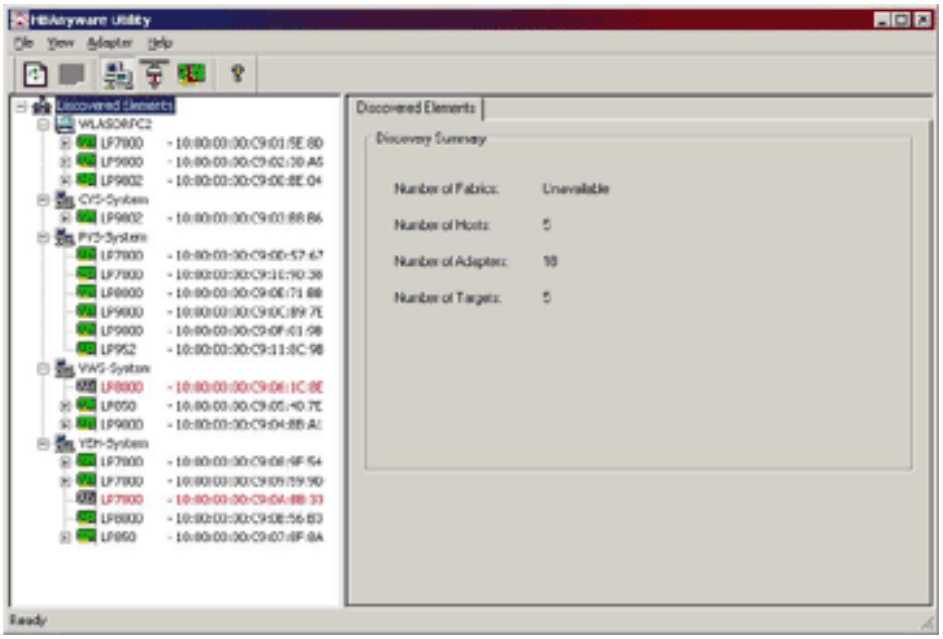
Discover HBAs Using HBAnyware

Local and remote host bus adapters (HBAs) are discovered automatically when you launch HBAnyware.

Note HBAnyware must be installed and the rmserver process (es) must be running on all remote hosts that are to be discovered and managed.

Remote capabilities of HBAnyware are subject to fabric zoning configuration. Remote hosts to be discovered and managed by HBAnyware must be in the same zone.



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List Adapters using lputil

When you start the LightPulse Utility (lputil), all adapters are listed with information such as the host adapter number, instance number (i.e. lpfc0), board model type, whether it is a standard or non-standard device and whether the adapter is ready to use.

From the Main menu, enter 1, List Adapters.

```
MAIN MENU

1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Binding

0. Exit

Enter choice => 1
```


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Reset Adapter - Introduction

You can reset adapters using either HBAnyware or lputil.

- HBAnyware allows you to reset remote and local adapters.
- lputil allows you to reset local adapters only.

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Reset HBAs Using HBAnyware

To reset a host bus adapter, do the following:

1. Start HBAnyware.
2. In the directory tree, click the HBA you want to reset.
3. Do one of the following:
    - From the menu bar, click Adapter, and then click Reset Adapter.
    - Click the Reset toolbar button.

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Reset Adapter

The LightPulse utility (lputil) allows you to reset the adapter. Once you start the utility, the Main menu is displayed.

If you have multiple adapters, select the adapter you want to reset.

Resetting the adapter runs self tests and reestablishes links (causes discovery of devices). Once the adapter has been successfully reset, the Main menu is displayed.

Caution Do not reset your adapter while copying or writing files. This could result in data loss or corruption. We recommend contacting Emulex Technical Support before resetting your adapter.

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View HBA Information - Introduction

You can view adapter information using either HBAnyware or lputil.

- HBAnyware allows you to view remote and local adapters.
- lputil allows you to view local adapters only.

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View HBA Information using HBAnyware

Using HBAnyware you can sort the way HBA's are displayed and view information about hosts, targets, fabrics, LUNs, ports, and more.

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Sort HBAs

Using HBAnyware, you can sort the way discovered adapters are displayed. You can sort adapters by host name, fabric addresses or local HBAs. By default, adapters are sorted by host name.

To sort adapters, do the following:

1. Start HBAnyware.
2. Switch between host name, fabric ID or local HBAs sorting in one of two ways:
    - From the menu bar: click View, then click Sort by Host Name, Sort by Fabric ID or Local HBAs Only. The current adapter display mode is checked.
    - From the toolbar, click one of the following buttons:

      Sort by host name (default).

      Sort by fabric ID.

      Sort by local HBAs only.
3. HBAnyware sorts in ascending order. The sort recognizes letters, numbers, spaces and punctuation marks.

Sort by Host Name

- Initially sorts by host name. Host names cannot be changed using HBAnyware; names must be changed locally on that system.
- Within each host system, sorts by HBA model.
- If multiple HBAs have the same model number, sorts models by world wide node name.
- If targets are present, sorts by world wide port name. Multiple HBAs may refer to the same target.
- If LUNs are present, sorts by LUN name.

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Sort by Fabric Address

- Initially sorts by fabric ID.
- Within each fabric ID, sorts by HBA model.
- If multiple HBAs have the same model number, sorts models by world wide node name.
- If targets are present, sorts by world wide port name. Multiple HBAs may refer to the same target.
- If LUNs are present, sorts by LUN name.
- If the fabric ID is all zeros, no fabric attachment is present.

Sort by Local HBAs Only

Sort by host name or fabric address.

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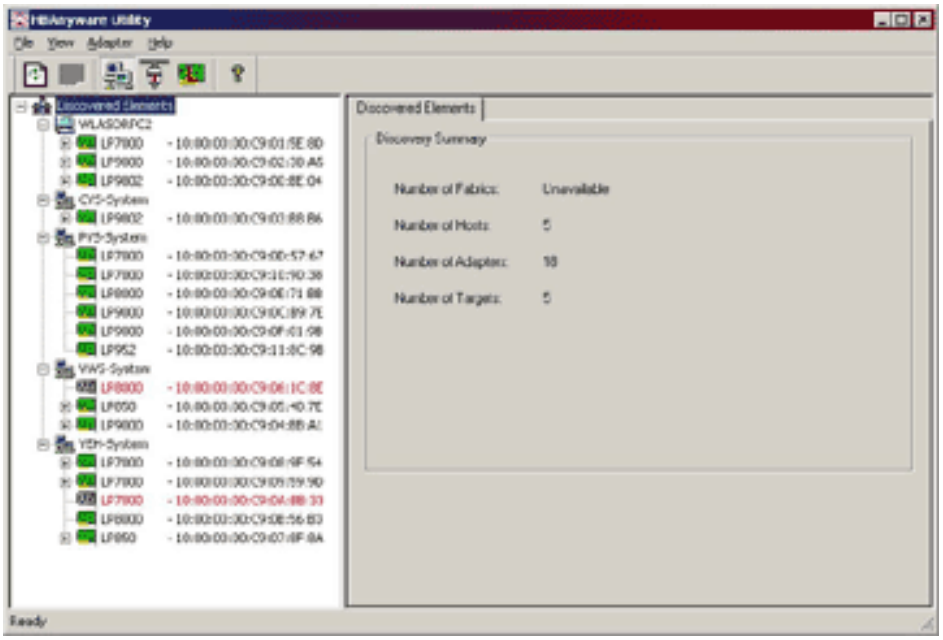
View Discovered Elements

The Discovered Elements tab in HBAnyware contains a general summary of the discovered elements. The Discovered Elements node is the root of the discovery tree, but it does not represent a specific network element. Expanding it will reveal all hosts, LUNs, targets and adapters that are visible on the SAN.

To view the discovered elements, do the following:

1. Start HBAnyware.
2. Click Discovered Elements in the discovery tree.



Field Definitions

Number of Fabrics - the total number of fabrics discovered (displays "Unavailable" if Sort by Host is active).

Number of Hosts - the total number of host computers discovered. This includes servers, workstations, personal computers, multiprocessors and clustered computer complexes (displays "Unavailable" if Sort by Fabric is active).

Number of Adapters - the total number of host bus adapters (HBAs) discovered.

Number of Targets - the total number of unique targets discovered on the SAN. In the discovery tree, the same target can appear under more than one HBA.

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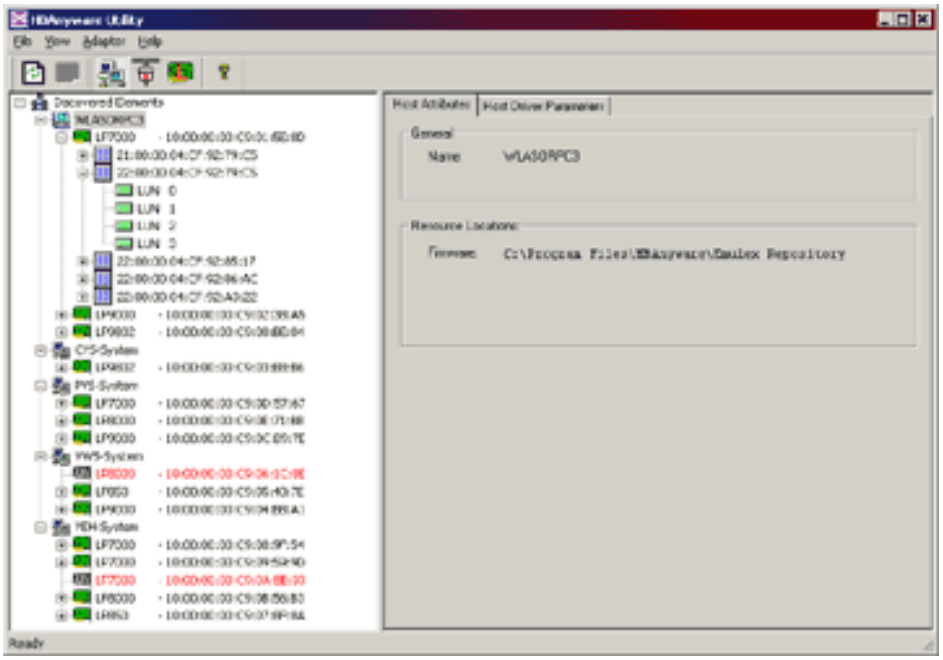
View Host Attributes

The Host Attributes tab in HBAnyware contains information specific to the selected host.

To view the host attributes, do the following:

1. Start HBAnyware.
2. Do one of the following:
    - From the menu bar, click View, then click Sort by Host Name.
    - From the toolbar, click the button.
3. Click a host name in the discovery tree.



General Area Field Definitions

Name - the name of the host.

Resource Location Field Definitions

Firmware - the directory path where the firmware image files are moved prior to being downloaded downloaded to the HBAs on that host.

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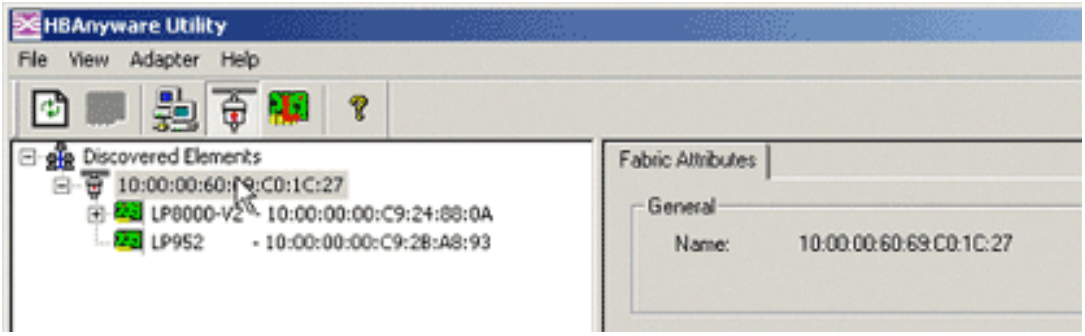
View Fabric Attributes

The Fabric Attributes tab in HBAnyware contains information specific to the selected fabric.

To view the fabric attributes, do the following:

1. Start HBAnyware.
2. Do one of the following:
    - From the menu bar, click View, then click Sort by Fabric ID.
    - From the toolbar, click the button.
3. Click on a fabric address in the discovery tree.



General Area Field Definitions

Name - a 64-bit unique identifier assigned to each Fibre Channel fabric.

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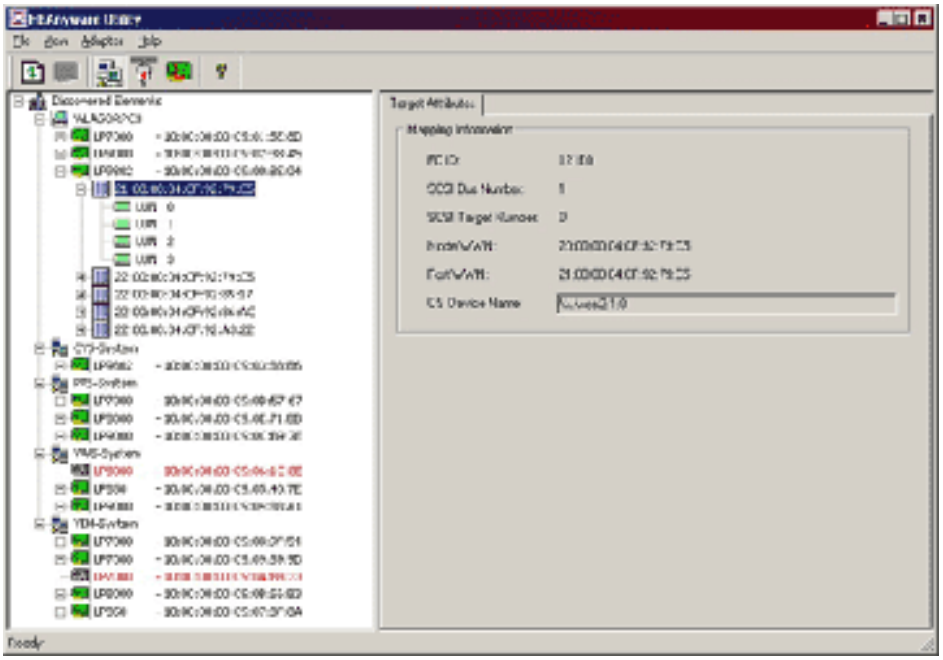
View Target Attributes

The Target Attributes tab in HBAnyware contains information specific to the selected target.

To view target attributes, do the following:

1. Start HBAnyware.
2. Do one of the following:
    - From the menu bar, click View, then click Sort by Host Name.
    - From the toolbar, click the button.
3. Click a target in the discovery tree.



Target Attributes Field Definitions

Vendor/Product Information

FC ID - the Fibre Channel ID for the target; assigned automatically in the firmware.

SCSI Bus Number - defines the SCSI bus to which the target is mapped.

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SCSI Target Number - the target's identifier on the SCSI bus.

Node WWN - the unique 64-bit number, in hexadecimal, for the target (N_PORT or NL_PORT).

Port WWN - the unique 64-bit number, in hexadecimal, for the fabric (F_PORT or FL_PORT).

OS Device Name - operating system device name.

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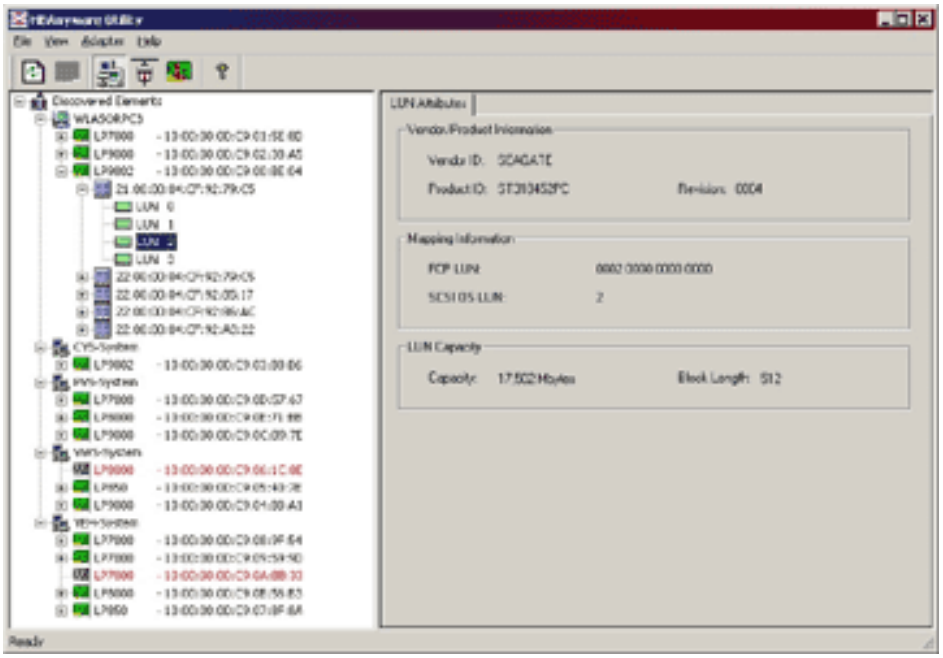
View LUN Attributes

The LUN Attributes tab in HBAnyware contains information specific to the selected logical unit number (LUN).

To view the LUN attributes, do the following:

1. Start HBAnyware.
2. Do one of the following:
    - From the menu bar, click View, then click Sort by Host Name.
    - From the toolbar, click the button.
3. Click a LUN in the discovery tree.



LUN Attributes Field Definitions

Vendor Product Information

Vendor ID - the name of the vendor of the logical unit.

Product ID - the vendor-specific ID for the logical unit.

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Revision - the vendor-specific revision number for the logical unit.

Mapping Information

FCP LUN - the Fibre Channel identifier used by the host bus adapter (HBA) to map to the SCSI OS LUN.

SCSI OS LUN - the SCSI identifier used by the operating system to map to the specific LUN.

LUN Capacity

Capacity - the capacity of the logical unit, in megabytes.

Block Length - the length of a logical unit block in bytes.

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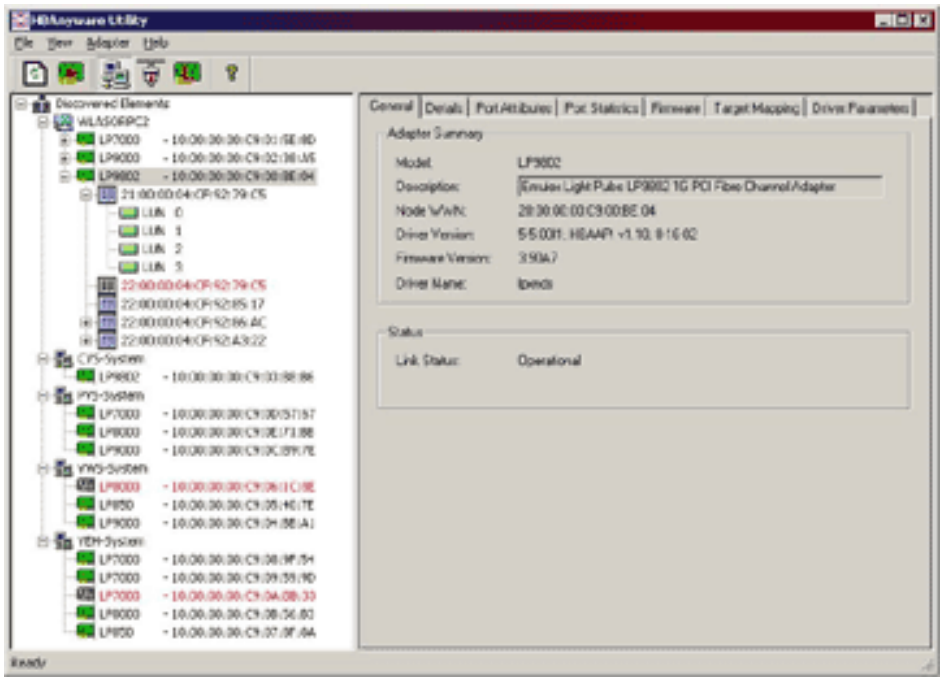
View General HBA Attributes

The General tab in HBAnyware contains general attributes associated with the selected host bus adapter (HBA).

To view general attributes, do the following:

1. Start HBAnyware.
2. If desired, sort the discovered HBAs.
3. Click an HBA in the discovery tree.



Adapter Summary Field Definitions

Model - the Emulex HBA model number.

Description - a formal description of the HBA, including model number, bus type and link speed. This field is recessed, indicating that the information in this field may exceed the visible length of the field. Use the arrow keys on your keyboard to scroll and view additional information.

Node WWN - a 64-bit worldwide unique identifier assigned to the node.

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Driver Version - the driver version number and the HBA application programming interface (HBA API) version number.

Firmware Version - the version of Emulex firmware currently active on the HBA.

Driver Name - the executable file image name for the driver as it appears in the Emulex driver download package.

Link Status Area

This field reflects the current state of the HBA. There are several possible states:

- The operational state indicates that the HBA is connected to the network and operating normally.
- All other states indicate that the HBA is not connected to the network. Gray HBA icons with red descriptive text indicate that the HBA is offline. These offline states are:
    - User offline - the adapter is down or not connected to the network.
    - Bypassed - the HBA is in Fibre Channel discovery mode.
    - Diagnostic Mode - the HBA had been taken over by a diagnostic program.
    - Link Down - there is no access to the network.
    - Port Error - the HBA is in an unknown state; try resetting it.
    - Loopback - an FC-1 mode in which information passed to the FC-1 transmitter is shunted directly to the FC-1 receiver. When a Fibre Channel interface is in loopback mode, the loopback signal overrides any external signal detected by the receiver.
    - Unknown - the HBA is offline for an unknown reason.
    - Resetting - the HBA is in the process of rebooting.
    - Downloading - a firmware or other image is being downloaded to the HBA.

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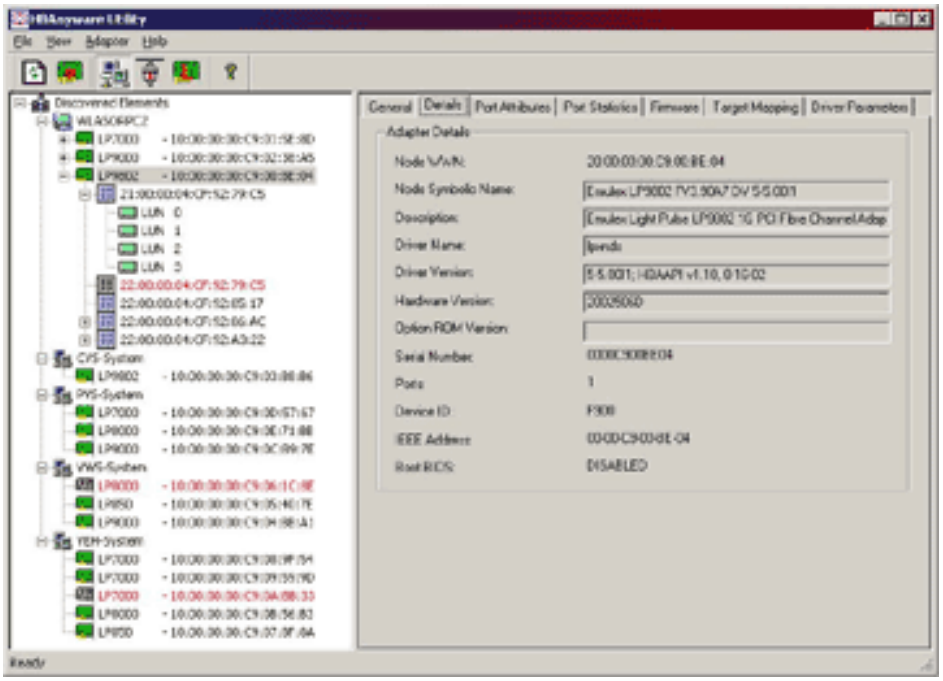
View Detailed HBA Attributes

The Details tab in HBAnyware contains detailed attributes associated with the selected HBA.

To view the detailed attributes, do the following:

1. Start HBAnyware.
2. If desired, sort the discovered HBAs.
3. Click an HBA in the discovery tree. The General tab is displayed.
4. Click the Details tab.



Note Recessed fields indicate that the information in that field may exceed the text display area of the field. Use the arrow keys on your keyboard to scroll and view additional information.

Adapter Details Field Definitions

- Node WWN - a 64-bit worldwide unique identifier assigned to the node.
- Node Symbolic Name - in a fabric, the name registered with the name server.

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- Description - a formal description of the HBA, including model number, bus type and link speed.
- Driver Name - an executable file image name for the driver as it appears in the Emulex driver download package.
- Driver Version - the driver version number and the HBA application programming interface (HBA API) version number.
- Hardware Version - the board version number, represented by the JEDEC ID, which is machine-readable from the Emulex ASIC.
- Option ROM Version - the optional read-only memory version number; displayed if the BootBIOS bootup message is enabled on the HBA.
- Serial Number - the serial number assigned to the HBA when it was manufactured. Typically, this is a BCD string of the 48-bit IEEE address for the HBA.
- Ports - the number of ports on the HBA. Currently, this is always one. The two ports of dual-channel HBAs are displayed in the discovery tree as two HBAs.
- Device ID - the HBA's default device ID.
- IEEE Address - the Media Access Control (MAC) address is in conformance with the Fibre Channel Link Encapsulation (FC-LE) standard. This address is a 48-bit number that is unique to every HBA in existence. The IEEE Address is printed on a label affixed to one end of the HBA.
- Boot BIOS - the enabled/disabled status of the BootBIOS message on the HBA. This message is updated automatically if the status of the BootBIOS message changes (caused by downloading a different firmware image).

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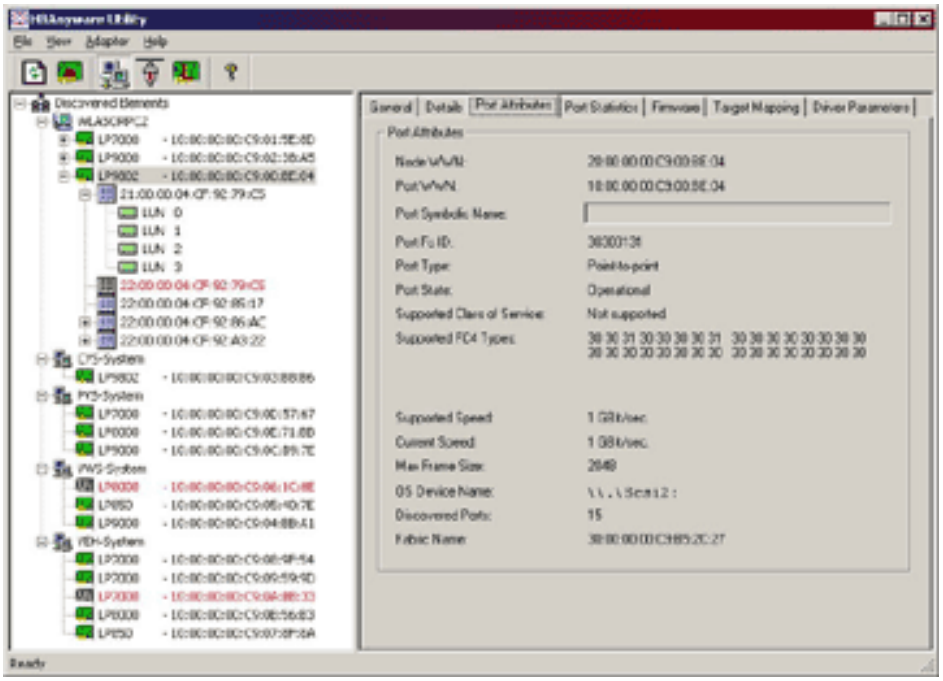
View Port Attributes

The Port Attributes tab in HBAnyware contains information about the port on the selected host bus adapter (HBA).

To view port attributes, do the following:

1. Start HBAnyware.
2. If desired, sort the discovered HBAs.
3. Click an adapter in the discovery tree. The General tab is displayed.
4. Click the Port Attributes tab.



Port Attributes Field Definitions

Node WWN - a 64-bit worldwide unique identifier assigned to the node. The Node WWN is communicated during the login and port discovery processes. This identifier stays with the entity for its lifetime.

Port WWN - a 64-bit worldwide unique identifier assigned to the port. The Port WWN is communicated during the login and port discovery processes. This identifier stays with the entity for its lifetime.

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Port Symbolic Name - the name registered by the HBA with a name server. This field is recessed, indicating that the information in this field may exceed the visible length of the field. Use the arrow keys on your keyboard to scroll and view additional information.

Port Fc ID - Fibre Channel ID for the port.

Port Type - describes the current operational mode of the port.

Port State - current status of the port: operational or link down.

Supported Class of Service - a frame delivery scheme exhibiting a set of delivery characteristics and attributes. There are three classes of service.

- Class-1 provides a dedicated connection between a pair of ports with confirmed delivery or notification of nondelivery.
- Class-2 provides a frame switched service with confirmed delivery or notification of nondelivery.
- Class-3 provides a frame switched service similar to Class-2 but without notification of frame delivery or non-delivery.

Supported FC4 Types - a 256-bit (8-word) map of the FC-4 protocol types supported by the port. Each bit in the map corresponds to a Type value as defined by the Fibre Channel standards and contained in the Type field of the frame header.

Supported Speed - maximum link speed supported by the HBA.

Current Speed - link speed for the current session.

Max Frame Size - maximum frame size.

OS Device Name - the platform-specific name by which the HBA is known to the operating system.

Discovered Ports - number of facilities that provide Fibre Channel interface attachment.

Fabric Name or Host Name - if fabric sort is selected, a 64-bit worldwide unique identifier assigned to the fabric. If host name is selected, the name of the host on which the HBA is installed.

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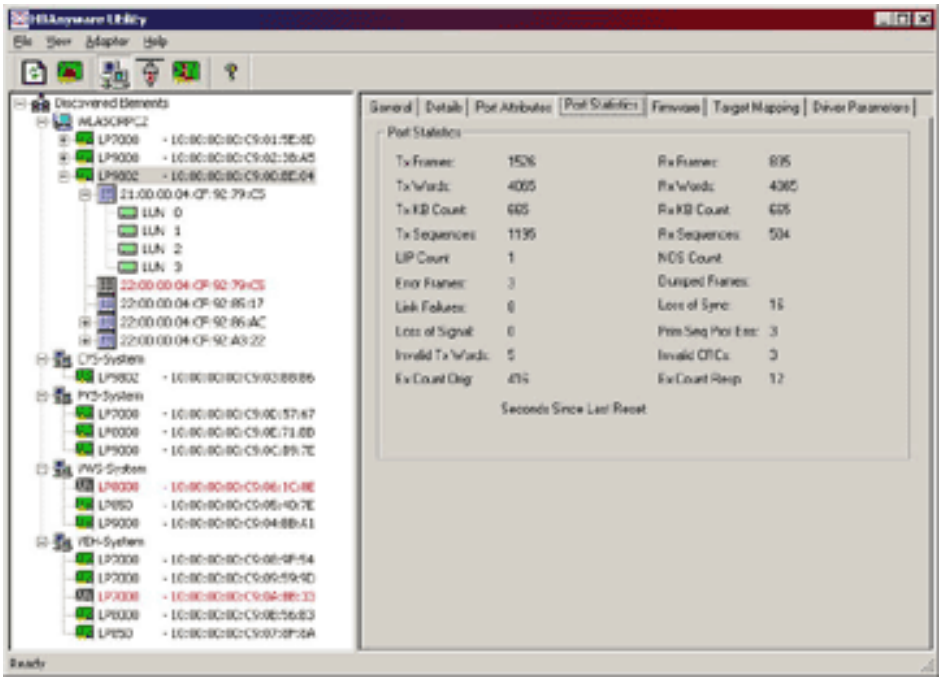
View Port Statistics

The Port Statistics tab in HBAnyware provides cumulative totals for various error events and statistics on the port. Statistics are cleared when the host bus adapter (HBA) is reset.

To view port statistics, do the following:

1. Start HBAnyware.
2. If desired, sort the discovered HBAs.
3. Click an HBA in the discovery tree. The General tab is displayed.
4. Click the Port Statistics tab.



Port Statistics Field Definitions

Tx Frames - Fibre Channel frames transmitted by this HBA port.

Tx Words - Fibre Channel words transmitted by this HBA port.

Tx KB Count - Fibre Channel kilobytes transmitted by this HBA port.

Tx Sequences - Fibre Channel sequences transmitted by this HBA port.

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LIP count - the number of loop initialization primitive (LIP) events that have occurred for the port. This field is not supported if the topology is not arbitrated loop. Loop initialization consists of the following:

- Temporarily suspend loop operations
- Determine whether loop capable ports are connected to the loop
- Assign AL_PA IDs
- Provide notification of configuration changes and loop failures
- Place loop ports in the "monitoring" state

Error Frames - the number of frames received with cyclic redundancy check (CRC) errors.

Link Failures - the number of times the link failed. A link failure is a possible cause of a timeout.

Loss of Signal - the number of times the signal was lost.

Invalid Tx Words - the total number of invalid words transmitted by this HBA port.

Ex Count Orig - the number of Fibre Channel exchanges originating on this port.

Rx Frames - the number of Fibre Channel frames received by this HBA port.

Rx Words - the number of Fibre Channel words received by this HBA port.

Rx KB Count - the received kilobyte count by this HBA port.

Rx Sequences - the number of Fibre Channel sequences received by this HBA port.

NOS count - this statistic is currently not supported for the SCSIport Miniport and Storport Miniport drivers, nor is it supported for arbitrated loop.

Dumped Frames - this statistic is not currently supported for the SCSIport Miniport driver, the Storport Miniport driver or the driver for Solaris.

Loss of Sync - the number of times loss of synchronization has occurred.

Prim Seq Prot Errs - the primitive sequence protocol error count. This counter is incremented whenever there is any type of protocol error.

Invalid CRCs - the number of frames received that contain CRC failures.

Ex Count Resp - the number of Fibre Channel exchange responses made by this port.

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View Adapter Information

The LightPulse Utility (lputil) allows you to view information for a selected adapter. Once you start lputil, the Main menu opens:

```
MAIN MENU

1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Binding

0. Exit

Enter choice => 2
```

Select choice #2. If you have multiple adapters, a list displays, you select an adapter and the Adapter Information Menu opens. If you have only one adapter, the Adapter Information Menu opens for that adapter.

```
ADAPTER INFORMATION MENU

1. PCI Configuration Parameters
2. Adapter Revision Levels
3. Wakeup Parameters
4. IEEE Address
5. Loop Map
6. Status and Counters
7. Link Status
8. Configuration Parameters

0. Return to Main Menu

Enter choice =>
```

PCI Configuration Parameters - Displays parameters from the PCI configuration space on the adapter. Examples of this information include vendor ID, device ID, base addresses, ROM address, header type, subclass and base class.

Adapter Revision Levels - Displays firmware revision levels, including kernel and overlay version information.

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Wakeup Parameters - Displays BIOS status and version, as well as SLI (service level interface).

IEEEE Address - Displays the adapter board address.

Loop Map - If you are currently using arbitrated loop topology, this menu option displays information about your connected devices, such as AL_PA and D_ID.

Status and Counters - Tracks such activities as link failure, loss synch and elastic overlay.

Configuration Parameters - Displays parameters such as link failure count, loss sync count and timeout.

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Update Firmware - Introduction

You can update firmware using either HBAnyware or lputil.

- HBAnyware allows you to update firmware on remote and local HBAs.
- lputil allows you to update firmware on local HBAs only.

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Load Firmware Using HBAnyware

Prerequisites

- One of the following drivers is installed properly:
    - SCSIport Miniport driver for Windows Server 2003, Windows 2000 or Windows NT
    - Storport Miniport driver for Windows Server 2003
    - FC Port driver for Windows Server 2003, Windows 2000 or Windows NT
    - Emulex driver for Solaris
    - Emulex driver for Linux
- HBAnyware has been installed properly.
- The firmware file has been downloaded from the Emulex Web site to the Emulex Repository folder (RMRepository). This folder is in the Program Files folder.
- The firmware file has been extracted into the Emulex Repository folder.

Loading Procedure

1. Start HBAnyware.
2. In the discovery tree (left pane), click the adapter to which you want to load the firmware.
3. In the property tabs (right pane), select the Firmware tab.

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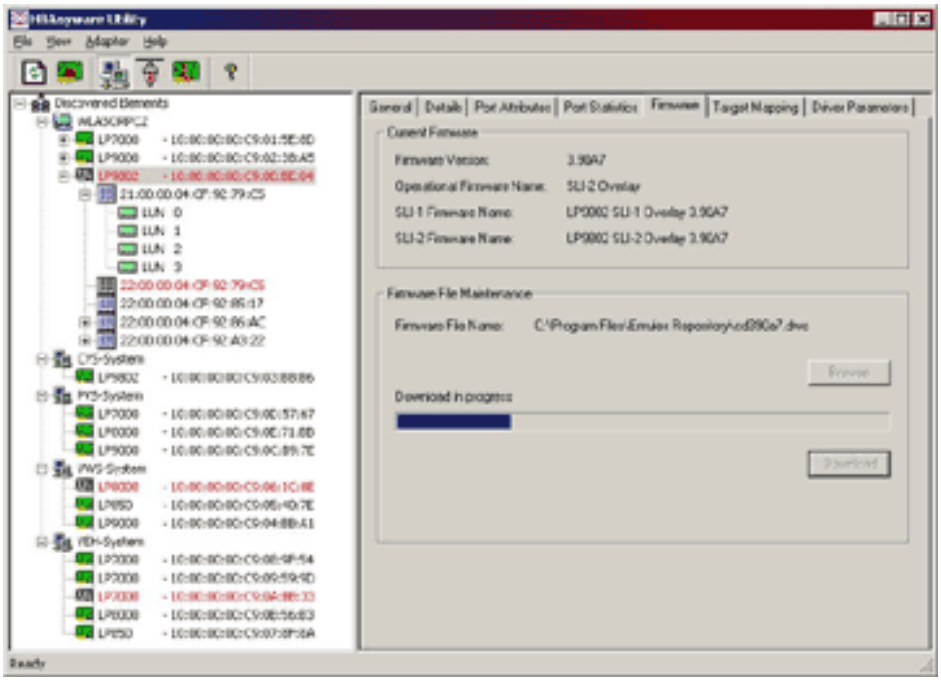

4. On the Firmware tab, click the Browse button. The Select Firmware File browse window is displayed.

5. Browse to the Emulex Repository. Select the firmware file to download and click OK. A status bar displays the progress of the download. During this time the host bus adapter (or adapters) in the discovery tree is displayed in red text, indicating that it is offline. It is displayed in black text when the update is complete.

If you are updating the firmware on a dual-channel HBA, repeat steps 2 through 5 to update the firmware on the second port.

Current Firmware Field Descriptions

Firmware Version - the Emulex firmware version number for this model of HBA.

Operational Firmware Name - if visible, the name of the firmware that is operational.

SLI-1 Firmware Name - the name of the SLI-1 firmware overlay.

SLI-2 Firmware Name - the name of the SLI-2 firmware overlay.

Note If the state of the boot code message on the board has changed, this change will be reflected immediately on the Details tab.

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Update Firmware

Prerequisites:

- The driver for Linux (including lputil) is installed properly.
- The firmware file has been downloaded to a local drive.

This procedure uses the lputil utility, which is installed with the driver.

Caution If you are using lputil to update firmware on an LP10000DC, LP10000, LP1050DC, LP1050 or LP9802DC HBA, you must use lputil version 1.5a0 or later. For any other HBA, you can use lputil version 1.4a4 or later.

Firmware versions differ between adapter versions. Make sure you have downloaded the appropriate firmware for your adapter.

Load Firmware

Caution Do not interrupt this process or power down the system until the process is complete.

1. Start the utility by entering the complete path to lputil. The path in the example reflects the default installation path. If the installation path was modified, adjust the command appropriately.

```
/usr/sbin/lpfc/lputil
```

2. From the Main menu, enter 3, Firmware Maintenance.
3. If prompted, choose the HBA that is being updated.
4. Enter 1, Load Firmware Image.
5. Enter the full path to the firmware file.

   The new firmware is transferred to flash ROM.

If you are updating the firmware on a dual-channel HBA, repeat steps 3 through 5 to update the firmware on the second port.

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FC Boot

Using the lputil utility you can:

- Update x86 BootBios
- Enable x86 BootBios
- Update EFI Boot
- Boot the EFI System

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Update x86 BootBIOS

Prerequisites:

- The driver for Linux (including lputil, which is used in this procedure) is installed properly.
- The boot code file has been downloaded to a local drive.

1. Start the utility by entering the complete path to lputil. The path in the example reflects the default installation path. If the installation path was modified, adjust the command appropriately.
    - If lputil was installed from an rpm file, enter the following command:

      ```
      /usr/sbin/lpfc/lputil
      ```

    - If lputil was installed from a tar file, the utility resides in the driver_installation_directory.

2. From the Main menu, enter 3, Firmware Maintenance.
3. Enter 1, Load Firmware Image.
4. Enter the full path to the boot code file.

   The new boot code is transferred to flash ROM.

5. Enter 0 twice to exit.

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Enable x86 BootBIOS

Prerequisites:

- The Emulex driver for Linux (including lputil, which is used in this procedure) is installed properly.
- The OpenBoot file has been downloaded to a local drive.

1. Start the utility by entering the complete path to lputil. The path in the example reflects the default installation path. If the installation path was modified, adjust the command appropriately.

   ```
   /usr/sbin/lpfc/lputil
   ```

2. From the Main menu, enter 3, Firmware Maintenance.

   The Firmware Maintenance menu is displayed.
3. From the Firmware Maintenance menu, press 6, Boot BIOS Maintenance.
   - If the boot code is currently disabled, press 1, Enable Boot BIOS, to enable the boot code.
   - If the boot code is already enabled, press 1, Disable Boot BIOS, to disable the boot code.
   - If the boot code is not currently loaded, the following message displays:

     ```
     There is no Boot BIOS found on adapter
     ```

4. Enter 0 twice to exit.

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Update EFIBoot

Prerequisites:

- One of the following drivers installed properly:
  - Driver for Linux IA-64, Red Hat Enterprise Linux 2.1
  - Driver for Linux IA-64, Red Hat Enterprise Linux 3 and SUSE Linux Enterprise Server 8
- lputil installed properly.
- The EFIBoot file has been downloaded to a local drive.

Procedure

1. Start the utility by entering the complete path to lputil. The path in the example reflects the default installation path. If the installation path was modified, adjust the command appropriately.
   - If lputil was installed from an rpm file, enter the following command:

     ```
     /usr/sbin/lpfc/lputil
     ```

   - If lputil was installed from a tar file, the utility resides in the driver_installation_directory.
2. From the Main menu, enter 3, Firmware Maintenance.
3. Enter 1, Load Firmware Image.
4. Enter the full path to the EFIBoot file.

   The new boot code is transferred to flash ROM.
5. Enter 0 twice to exit.

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Boot the EFI System

Note If you do not have the most recent firmware, it is suggested that you update the firmware first. Go to the firmware section for downloads and procedures.

Prerequisites

- The EFIBoot file must be flashed to the host bus adapter to which the boot device is attached.

Procedure

1. Boot the 64-bit EFI system.
2. Once the EFIBoot driver is loaded in an EFI shell, type the following to verify that the driver is loaded:

   Drivers

   Information similiar to the following will be displayed:

94	00030015	D	X	X	6	-	Emulex SCSI Pass Thru driver	Elxcli
95	00030015	?	-	X	-	-	Emulex Fibre HBA driver	Elxcli
96	00030015	?	-	X	-	-	Emulex Fibre Disk driver	Elxcli

   - Emulex SCSI Passthru driver: This driver produces a SCSI pass through handle for each Emulex Adapter.
   - Emulex Fibre Fibre HBA driver: This driver produces a SCSI/FIBRE device path handle for each device found.
   - Emulex Fibre Disk driver: This driver produces a block IO protocol for each SCSI/FIBRE Device path.

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Configuring the Driver

You can configure the driver using HBAnyware or lpfc.conf

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Set Driver Parameters Using HBAnyware

The Driver Parameters tab allows you to modify driver parameters either for an individual adapter or for all adapters, with the same single driver type and version, that are in one host.

For example, if you set driver parameters on a host that includes two adapters with the SCSIport Miniport driver installed, you can make changes to the driver parameters for both adapters simultaneously.

For each parameter, the tab displays the current value, the range of acceptable values, the default value, and whether the parameter is dynamic (a dynamic parameter allows the change to take effect without restarting the HBA or rebooting the system).

This page contains instructions for the following:

- View Driver Parameters for an Adapter
- View Driver Parameters for a Host
- Change a Parameter's Value
- Restore Parameters to Their Earlier Values
- Reset All Default Values

View Driver Parameters for an Adapter

To display the driver parameters for an adapter, do the following:

1. Start HBAnyware.
2. Do one of the following:
    - From the menu bar, click View, then click Sort by Host Name.
    - From the toolbar, click the button.
3. In the discovery tree, click the adapter for which you want to change a parameter. The General tab is displayed.
4. Click the Driver Parameters tab. The Installed Driver Types field displays the driver that is installed on the adapter.

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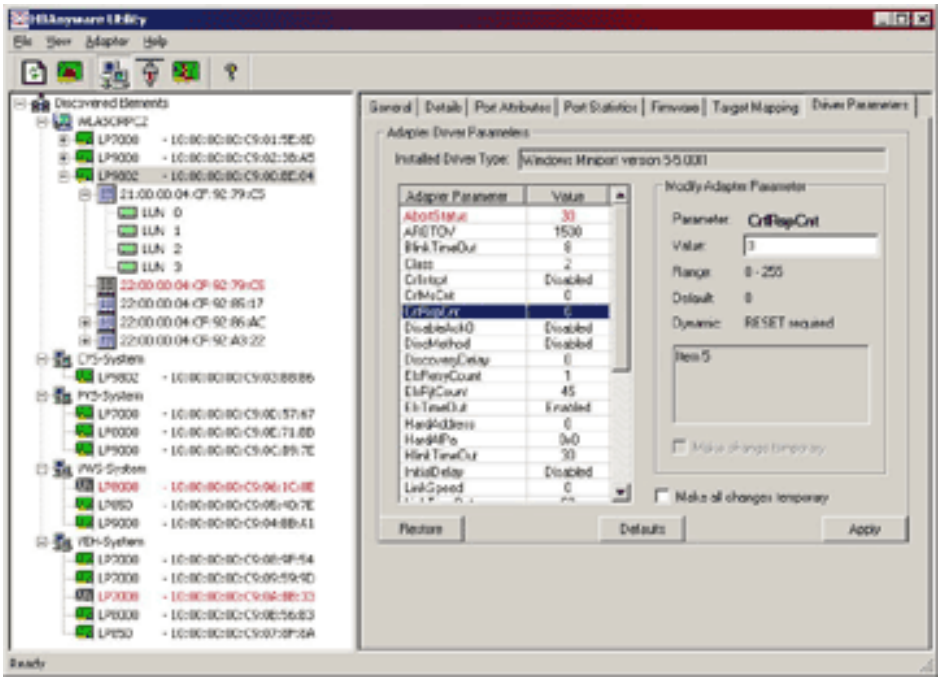

Note The illustration above is an example. The driver parameters you see may be different, depending on the installed driver.

View Driver Parameters for a Host

To display the driver parameters for a host, do the following:

1. Start HBAnyware.
2. Do one of the following:
   - From the menu bar, click View, then click Sort by Host Name.
   - From the toolbar, click the button.
3. In the discovery tree, click the host for which you want to change a parameter. The Host Attributes tab is displayed.
4. Click the Host Driver Parameters tab. The Installed Driver Types drop-down box displays a list of all driver types and driver versions that are installed on the adapters in the host. Click the driver for which you want to make changes.

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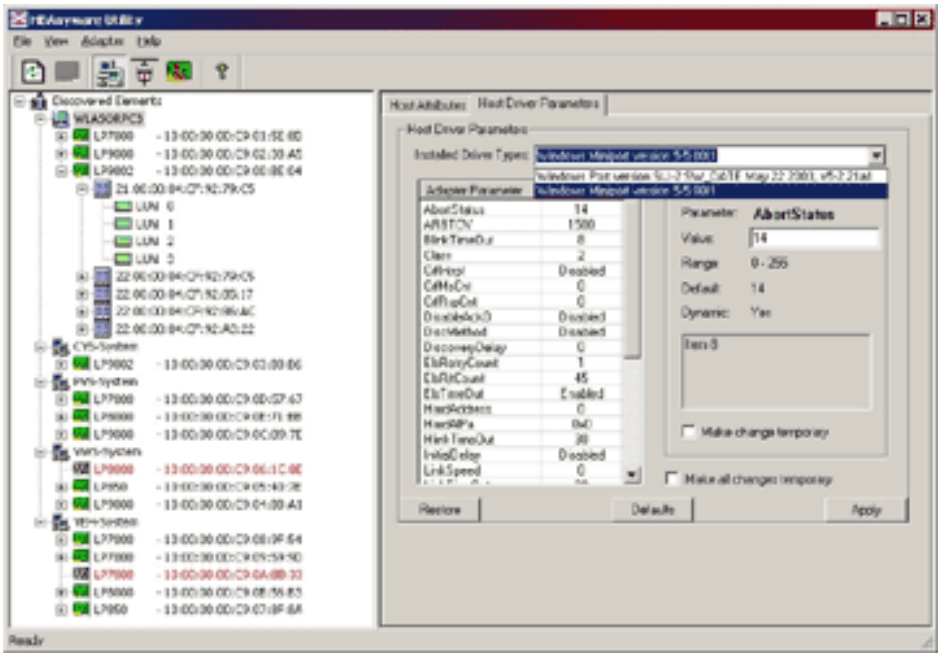

Note The illustration above is an example. The driver parameters you see may be different, depending on the installed driver.

Change a Parameter's Value

After you follow the appropriate procedure to display the host or adapter parameter tab, do the following to change a parameter's value:

1. In the driver parameters tab, click the parameter that you want to change. Information about the parameter appears on the right side of the screen.

2. Enter a new value in the Value field. You must enter values in decimal or hexadecimal format, depending on how the current value is presented. If the value is in hexadecimal format, it is prefaced by "0x", for example 0x2d, and if you change the value you must enter it in hexadecimal format.

3. If you want the change to be temporary (causing the parameter to revert to its last permanent setting when the system is rebooted), check the "Make change temporary" box. This option is available only for dynamic parameters.

4. If you are making changes to multiple parameters, and you want all the changes to be temporary, check the "Make all changes temporary" box. This setting overrides the setting of the "Make change temporary" box. Only dynamic parameters can be made temporary.

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5. To apply your changes, click Apply.

Restore All Parameters to Their Earlier Values

If you have made changes to parameters and have not saved them by clicking Apply, and you want to restore the parameters to their last saved values, click Restore.

Reset All Default Values

If you want to reset all parameter values to their default (out-of-box) values, click Defaults.

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Configuration Methods

There are four ways to configure the driver:

- Permanently (global)
- Permanently (per adapter)
- Temporary (global)
- Temporary (per adapter)

Permanent Configuration Methods

Permanent configuration requires that the new values be saved and the driver rebuilt. These changes are considered permanent because they stay in effect until a driver parameter is changed, saved and rebuilt again.

All parameters are contained in /etc/lpfc.conf which is symbolically linked to lpfc.conf in the driver installation directory.

To make changes that impact all host bus adapters in the system (global changes), edit the lpfc.conf file. Parameter values are hexadecimal.

1. Go to the driver source directory.
2. Edit lpfc.conf to change the desired parameter.
3. Save the changes.
4. Rebuild the driver or build a new kernel with the driver (if applicable).

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Example of Permanent Global Configuration

You want to set lun_queue_depth to 20 (default is 30) for all host bus adapters in your system.

1. Locate the following parameter:

```
lpfc_lun_queue_depth = 30;
```

2. Edit the parameter to display the following:

```
lpfc_lun_queue_depth = 0x14;
```

3. Save the change.

4. Rebuild the driver or build a new kernel with the driver (if applicable).

To make changes for specific adapters, edit the lpfc.conf file. Parameter values are hexadecimal.

1. Go to the driver source directory.

2. Edit lpfc.conf (change the desired parameter for a specific adapter or adapters).

3. Save your changes.

4. Rebuild the driver or build a new kernel with the driver (if applicable).

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Example of Permanent Per Adapter Configuration

You want to set lun_queue_depth to 20 (default is 30) for host bus adapter #1.

1. Locate the following parameter:

```
lpfc1_lun_queue_depth = -1;
```

2. Edit the parameter to display the following:

```
lpfc1_lun_queue_depth = 0x14;
```

3. Save the change.
4. Rebuild the driver or build a new kernel with the driver (if applicable).

Temporary Configuration Method

When you manually load the driver as a module using the insmod command and change one or more driver parameter values, it is a temporary configuration. These changes are considered temporary because they are valid for the current session only or until the driver is manually loaded again. Using the insmod command requires no editing or saving. This temporary configuration method overrides the lpfc.conf file for the current session.

Values are always hexadecimal. You can set up temporary configurations to be on a global or per adapter basis.

Example of Temporary Global Configuration

You want to temporarily set lun_queue_depth to 20 (default is 30) for all host bus adapters in your system. Load the driver with the following command:

```
insmod lpfcdd lpfc_lun_queue_depth = 0x14;
```


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Example of Temporary Per Adapter Configuration

You want to temporarily set lun_queue_depth to 20 (default is 30) for host bus adapter #1. Load the driver with the following command:

```
insmod lpfcdd lpfc1_lun_queue_depth = 0x14;
```

Note Refer to the lpfc.conf file for the correct parameter name and values for the parameter you want to change.

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Set Up LUN Support

By default, the Linux kernel does not support multiple LUNs. To support multiple LUNs, edit /etc/lilo.conf and append the following line to the end of the file:

```
append="max_scsi_luns=X"
```

where: ***X*** is the number of LUNs per SCSI device, between 1 and 128.

Before you build a new kernel, run the ‘make menuconfig’ command and build a menu to configure the kernel and drivers. This configuration menu contains SCSI options. Ensure that the SCSI option, ‘Probe all LUNs’ is enabled.

Note You must reboot the system for these changes to take effect.

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Dynamically Add LUNs and Targets

Using a script, the Emulex driver for Linux enables you to dynamically add LUNs and targets without unloading or reloading the lpfcdd module and without resetting the adapter.

> **Note** The script assumes dfc has been installed under /usr/sbin/lpfc.

To dynamically add LUNS and targets.

1. Download the script from the Emulex Driver for Linux "Downloads" page.
2. Type:

```
sh force_lpfc_scan.sh "lpfc#"
```

3. Make the SCSI mid-layer re-scan for the newly added LUN. Type:

```
# echo "scsi add-single-device 0 1 2 3" >/proc/scsi/scsi
```

   Where ***0 1 2 3*** is replaced by your "Host Channel Id LUN".

> **Note** The host number is the SCSI # as seen in /proc/scsi/scsi. The host # and lpfc # in the previous step may not be identical. This is because lpfc0 may not be the first SCSI host in the system.

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Configuring IP Networking

When configuring for IP service you must supply the name of the host machine that Linux should use for a particular network interface. At installation time, if you indicated that lpfc should provide IP networking service over Fibre Channel you should set up a /etc/sysconfig/network-scripts/ifcfg-lpfn<0-N> file for each LightPulse adapter being configured.

By default, "network" is set to O and must be set to 1 prior to building the driver.

Note Names you specify in these ifcfg-lpfn<0-N> files must have valid IP addresses associated with them, via NIS or DNS or whatever hostname-to-IP-address translation scheme you employ.

Below is an example ifcfg-lpfn<0-N> file:

```
DEVICE=lpfn0                    # Where X is the lpfc interface number
IPADDR=xxx.xxx.xxx.xxx          # A valid IP address for this interface
BROADCAST=xxx.xxx.xxx.xxx       # The broadcast address for this interface
NETWORK=xxx.xxx.xxx.xxx         # The network address for this interface
NETMASK=xxx.xxx.xxx.xxx         # The network interface for the interface
ONBOOT=no                       # Determine if interface will be brought up
                                # at system boot time
```

Note The file, ifcfg-eth0 can also be used as an example. You must restart the network interfaces either by rebooting the machine or by manually typing ifdown lpfn<0-N> and ifup <0-N> for these changes to take effect.

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Understand Device Numbering

There are two levels of device numbering. The first level of device numbering is the driver instance number. This is the number that is displayed in log messages to syslog or the console, such as lpfc***X***. Typically the driver instance number is equal to the adapter number.

The second level of numbering is the SCSI device number. This number is assigned by the system for each SCSI target it detects. It is typically in the special files created to access each SCSI device, for example, /dev/sda through /dev/sdz and /dev/sdaa through /dev/sdax etc. Linux supports a total of 128 SCSI devices per system. Thus, a host could support disk devices from /dev/sda through /dev/sddx.

Once these numbers are assigned, they will stay the same between reboots unless there has been hardware changes to the system or Fibre Channel network, or some devices are offline or not ready.

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Download PCI Configuration

> **Note** Select this option **only** if you are familiar with PCI configuration registers.

To download the PCI configuration data, follow these steps.

1. Start the utility.
2. From the lputil Main menu, select 3, Firmware Maintenance.

   The Firmware Maintenance menu is displayed.
3. Select 5, Load PCI Configuration File. PCI configuration data is contained in .cfl files, which can be used across any supported platform.
4. Enter the region in flash ROM to download the data, and press <Enter>.

   You can download one of three data sets for the PCI configuration registers.

   - Default PCI configuration region
   - PCI configuration region 1
   - PCI configuration region 2
5. Upon completion, press 0 to return to Main menu.
6. Press 0 to exit the utility.
7. Power down the system.
8. Restart the system to load new configuration data.

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The Configuration File (lpfc.conf)

The lpfc.conf file contains all the variables that control driver initialization.

> **Note** Utilities such as HBAnyware expect to find lpfc.conf installed in /etc directory. If documented install procedures are followed, a link to lpfc.conf file is automatically created in the /etc directory.

In the lpfc.conf file, all adapter-specific parameters have lpfcX_ prefix (where X is the driver instance number); e.g., setting lpfc0_num_iocbs = 2000 allocates 2000 I/O control blocks for the driver interface lpfc0. A value of -1 for an adapter specific parameter will assign the default value for that parameter as denoted by lpfc_param.

Changes to the /etc/lpfc.conf file require a driver rebuild and reload for the changes to take effect.

> **Note** If you want to override a driver parameter for a single driver-loading session, you can specify it as a parameter to the insmod command. For example:
>
> ```
> # insmod ./lpfcdd.o lpfc_automap=0
> ```
>
> This will load Emulex's SCSI support driver with lpfc_automap set to 0 for this session.

If you load the driver with the help of /etc/modules.conf, you can also specify changes to driver parameters in /etc/modules.conf. For example:

```
options lpfcdd lpfc_automap=0 lpfc_bind_entries=1 \
lpfc_fcp_bind_WWPN=50060482c33ed60f:lpfc1t1
```

would bind device with WWPN 50060482c33ed60f to target 1, with no other device mapped.

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The table below describing the lpfc.conf parameters is color-coded based on the effect of the parameter.

A clear row indicates that the parameter affects both FCP storage and IP networking
A green row indicates that the parameter affects FCP storage only.
A yellow row indicates that the parameter affects IP networking only.

The "Dynamic" column in the table below indicates if the parameter can be changed while driver is loaded and operational. A "No" in the "Dynamic" column indicates that the driver must be restarted for the change to take effect.

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Variable	Default	Min	Max	Dynamic	Comments
lpfc_ack0	0	0	1	No	Use ACK0 for class 2.
lpfc_automap	1	0	1	No	Automatically assign SCSI IDs to FCP targets detected.
lpfc_check_cond_err	0	Boolean 0=false, 1=true		Yes	Treat certain FCP check conditions as FCP RSP errors.
lpfc_cr_count	1	0	255	No	Default values for I/O colaesing cr_count outstanding commands.
lpfc_cr_delay	0	0	63	No	Default values for I/O colaesing cr_delay ms outstanding commands.
lpfc_delay_rsp_err	0	Boolean 0=false, 1=true		Yes	Treat FCP RSP errors like no-device-delay.
lpfc_discovery_threads	1	0	64	No	Specifies the maximum number of ELS commands that can be outstanding for a discovery.

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lpfc_dqfull_throttle_up_inc	1	0	128	Yes	Amount to increment LUN queue depth each time.
lpfc_dqfull_throttle_up_time	1	0	30	Yes	Time interval, in seconds, to increment LUN queue depth.
lpfc_fcp_bind_DID	inactive	N/A	N/A	No	Bind specific SCSI IDs to targets based on Fibre Channel Port ID.
lpfc_fcp_bind_method	2	1	4	No	Specifies the bind method (WWWN/ WWPN/DID/ ALPHA map) to be used.
lpfc_fcp_bind_WWNN	inactive	N/A	N/A	No	Bind specific SCSI IDs to targets based on Fibre Channel WWNN.
lpfc_fcp_bind_WWPN	inactive	N/A	N/A	No	Bind specific SCSI IDs to targets based on Fibre Channel WWPN.

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lpfc_fcp_class	3	2	3	Yes	Fibre Channel class for FCP data transmission.
lpfc_fdmi_on	0	0	2	No	False (0) if disabled. (1) or (2) if enabled depending on type of support needed.
lpfc_extra_io_tmo Formerly lpfc_fcpfabric_tmo	0	0	255	Yes	Extra FCP cmd timeout when connected to a fabric (in seconds).
lpfc_ip_class	3	2	3	Yes	Fibre Channel class for IP data transmission.
lpfc_linkdown_tmo	30	0	255	Yes	(seconds) How long the driver waits before deciding that the Fibre Channel link is down.
lpfc_link_speed	0	0	2	No	Set link speed: auto detect, 1G, 2G.
lpfc_log_verbose	0x0	0x0	0xffff	Yes	(bit mask) Extra activity logging.

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lpfc_lun_queue_depth	30	1	128	No	Default max commands sent to a single logical unit (disk).
lpfc_max_lun	127	0	127	Yes	Specifies the maximum number of LUNs per target. A value of 20 means LUNs from 0 to 19 are valid.
lpfc_max_target	255	0	255	No	Linux scans all targets. This configuration parameter limits how many targets / LUNs the driver will support.Don't exceed 255, otherwise device scan will wrap around.
lpfc_lun_skip	0	Boolean 0=false, 1=true		No	Fake out the Linux SCSI layer to detect all LUNs if there are no LUN holes on a device.
lpfc_network_on	0	Boolean 0=false, 1=true		No	Turn on IP networking.

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lpfc_nodev_holdio	0	Boolean 0=false, 1=true		Yes	Hold I/O err if device disappears.
lpfc_no_device_delay	1	0	30	Yes	Delay to fail back an I/O in seconds.
lpfc_nodev_tmo	30	0	255	Yes	Seconds to hold I/O err if device disappears.
lpfc_num_bufs	128	64	4,096	No	ELS and misc data buffers.
lpfc_num_iocbs	256	128	10,240	No	Adapter command/ response structures.
lpfc_post_ip_buf	128	64	1024	No	Buffers to post to IP ring.
lpfc_scan_down	1	0	1	Yes	Select method for scanning ALPA to assign a SCSI ID.
lpfc_scsi_req_tmo	30	30	255	No	Time out value (in seconds) for SCSI request sent.
lpfc_tgt_queue_depth	0	0	10240	No	Default max commands sent to a single target.

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lpfc_topology	0	N/A	N/A	No	Fibre Channel link topology (defaults to loop, if it fails attempts point-to-point mode).
lpfc_use_adisc	0	Boolean 0=false, 1=true		Yes	Send ADISC instead of PLOGI for device discovery or RSCN.
lpfc_post_ip_buff	128	64	1024	Yes	Buffers to post to IP ring
lpfc_xmt_que_size	256	128	10,240	No	Transmit queue length for mbufs.

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Load an Updated Version of Boot Code Using the Emulex Utility for Linux

Prerequisites:

- The driver for Linux (including lputil, which is used in this procedure) is installed properly.
- The boot code file has been downloaded to a local drive.

1. Start the utility by entering the complete path to lputil. The path in the example reflects the default installation path. If the installation path was modified, adjust the command appropriately.
    - If lputil was installed from an rpm file, enter the following command:

      ```
      /usr/sbin/lpfc/lputil
      ```

    - If lputil was installed from a tar file, the utility resides in the driver_installation_directory.

2. From the Main menu, enter 3, Firmware Maintenance.
3. Enter 1, Load Firmware Image.
4. Enter the full path to the boot code file.

   The new boot code is transferred to flash ROM.

5. Enter 0 twice to exit.

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Enable BootBIOS

Prerequisites:

- The Emulex driver for Linux (including lputil, which is used in this procedure) is installed properly.
- The OpenBoot file has been downloaded to a local drive.

1. Start the utility by entering the complete path to lputil. The path in the example reflects the default installation path. If the installation path was modified, adjust the command appropriately.

   ```
   /usr/sbin/lpfc/lputil
   ```

2. From the Main menu, enter 3, Firmware Maintenance.

   The Firmware Maintenance menu is displayed.
3. From the Firmware Maintenance menu, press 6, Boot BIOS Maintenance.
   - If the boot code is currently disabled, press 1, Enable Boot BIOS, to enable the boot code.
   - If the boot code is already enabled, press 1, Disable Boot BIOS, to disable the boot code.
   - If the boot code is not currently loaded, the following message displays:

     ```
     There is no Boot BIOS found on adapter
     ```

4. Enter 0 twice to exit.

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Using the 'devlabel' Tool

The devlabel tool provided by Red Hat for Red Hat Enterprise Linux 3 manages persistent names for Fibre Channel and other disk devices.

Using the devlabel utility, you can add persistent names, remove persistent names, or show persistent names.

Visit the Red Hat web site for more information.

To add a persistent name:

Type:

```
# devlabel add -d <device> -s <symlink>
```

For example:

```
# devlabel add -d /dev/sdb1 -s /dev/mydata
```

This example creates the persistent name /dev/mydata, which points to /dev/sdb1.

To remove a persistent name:

Type:

```
# devlabel remove -s <symlink>
```

For example:

```
# devlabel remove -s /dev/mydata
```

This example removes the persistent name /dev/mydata.

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To show persistent names:

Type:

```
# devlabel status
```

This command displays all persistent names in the system.

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View Target Mapping and Set Up Persistent Binding

The Target Mapping tab in HBAnyware enables you to view current target mapping and to set up persistent binding.

View Target Mapping

To view the Target Mapping tab, do the following:

1. Start HBAnyware.
2. Do one of the following:
    - From the menu bar, click View, then click Sort by Host Name.
    - From the toolbar, click the button.
3. Click a target in the discovery tree.

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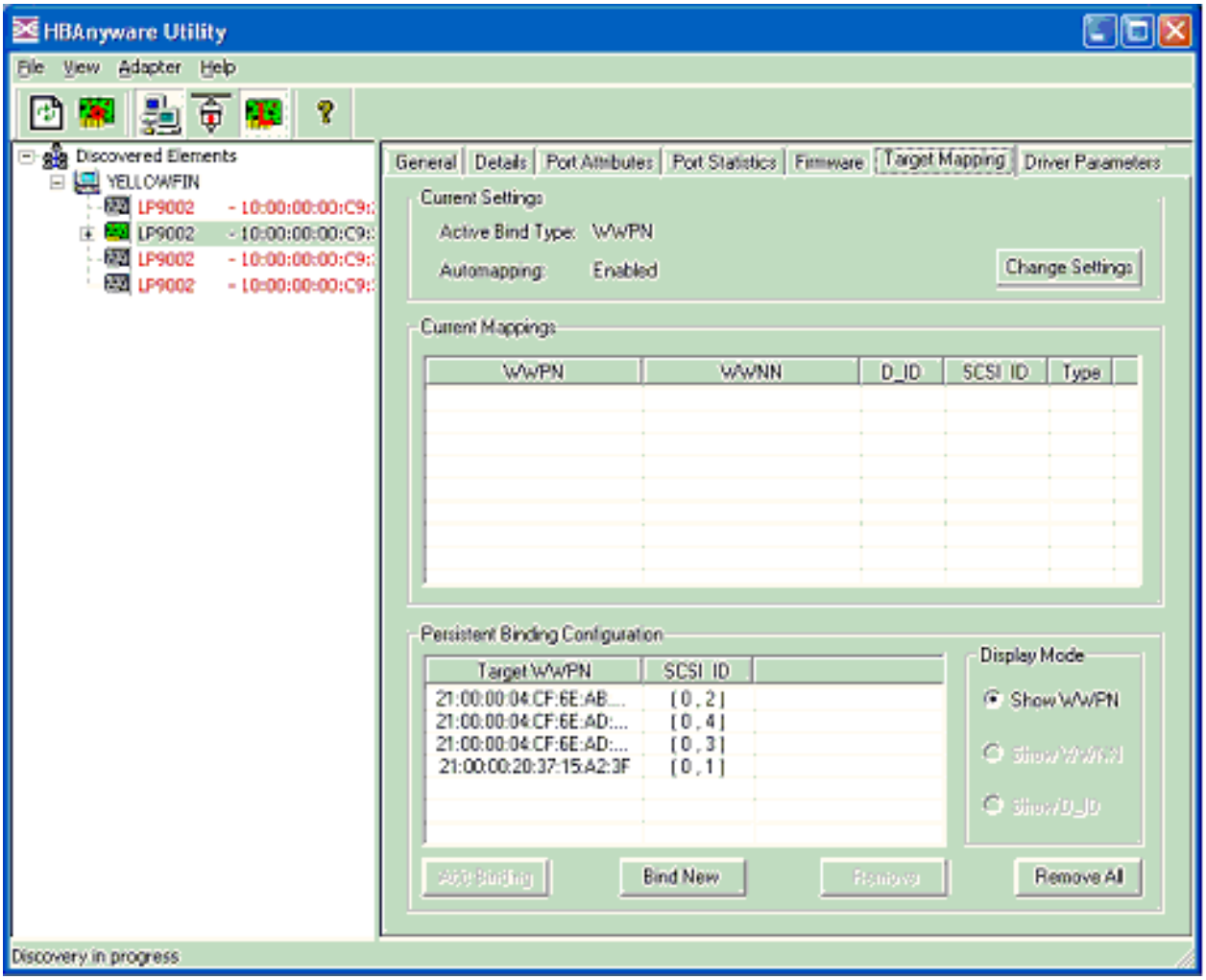

Set Up Persistent Binding

To set up persistent binding, do the following:

1. Start HBAnyware.
2. In the directory tree, click the host bus adapter (HBA) for which you want to set up persistent binding.
3. Click the Target Mapping tab. All targets are displayed.
4. Target mappings are displayed by world wide port name (WWPN), world wide node name (WWNN), device ID (D_ID), SCSI ID, or Type. This can be either 'PB', indicating that the mapping was the result of a persistent binding, or 'Auto', indicating that the target was automapped. In the Display Mode section, choose the display mode you want to use.
5. If you want to change the Active Bind Type (the mode used to persistently bind

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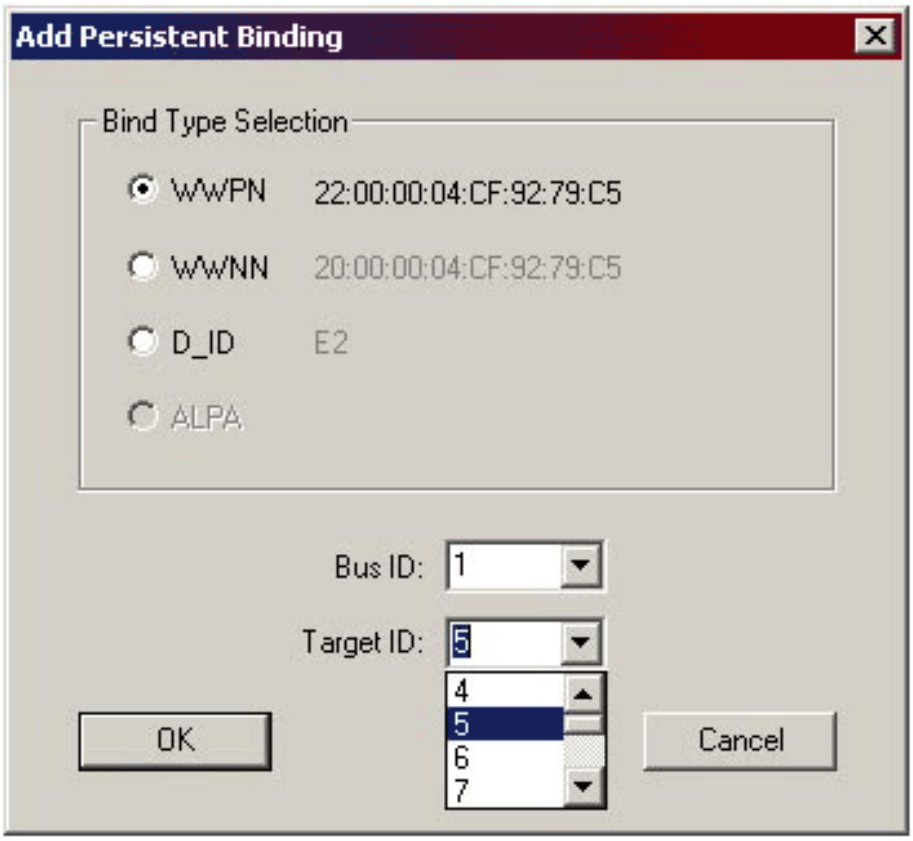
target mappings) or Automapping setting, click Change Settings. Select the Active Bind Type (WWPN, WWNN or D_ID), and set Automapping to Enabled or Disabled.

To add a persistent binding, do the following:

1. In the Targets Table, click the target that you want to bind.
2. Click Add. The Add Persistent Binding dialog box is displayed.



3. Select the Bind Type that you want to use (WWPN, WWNN or D_ID).
4. Select the Bus ID and Target ID that you want to bind, and click OK.

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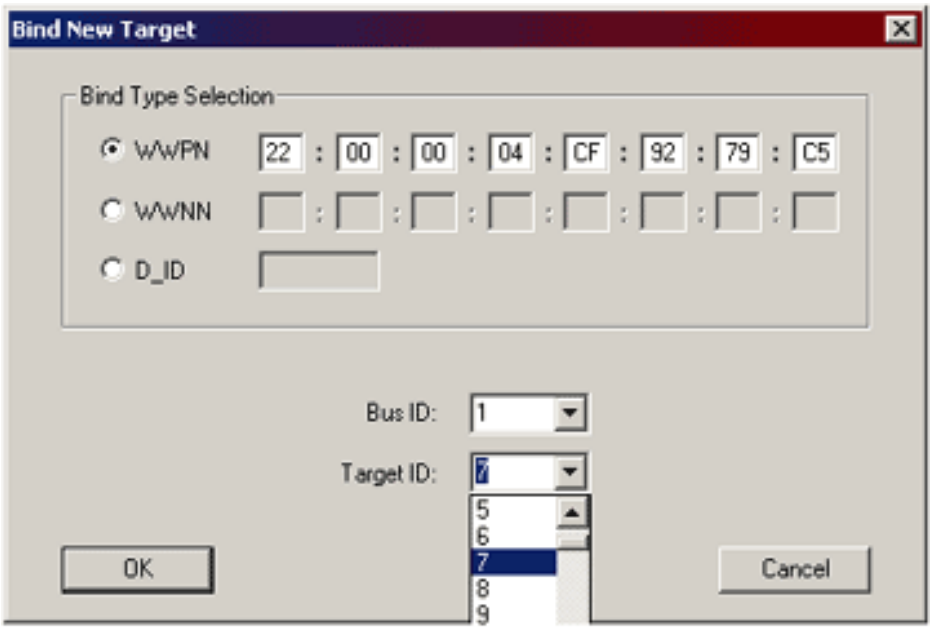
Note Automapped targets will have entries only in the second column of the Targets Table. Persistently bound targets will have entries in the second and third columns. In this case, the third column contains the SCSI bus and target numbers you specified in the Add Persistent Binding dialog box. This binding will take effect only after the local machine is rebooted.

It is possible to specify a SCSI bus and target that have already been used on behalf of a different FC target. HBAnyware does not detect this until you click the OK button in the Add dialog box. Then a "duplicate binding" error message is displayed, and the request is rejected.

To bind a target that does not appear in the Persistent Binding Table, do the following:

1. Click Bind New. The Bind New Target dialog box is displayed.



2. Click the type of binding you want to use, and type the WWPN, WWNN or D_ID you want to bind to the target.

3. Select the Bus ID and Target ID that you want to bind, and click OK.

Note A target will not appear on the target list if automapping has been disabled and the target is not already persistently bound.

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HBAnyware Security Overview

After the base HBAnyware software, which includes the HBAnyware utility and remote server, is installed on a group of systems, the HBAnyware utility on any of those systems can remotely access and manage the HBAs on any of the other systems. This may not be a desirable situation, because any system can perform actions such as resetting boards or downloading firmware.

The HBAnyware security package can be used to control which HBAnyware systems can remotely access and manage HBAs on other systems in a Fibre Channel network. HBAnyware security is systems-based, not user-based. Anyone with access to a system that has been granted HBAnyware client access to remote HBAs can manage those HBAs. Any unsecured system is still remotely accessible by the HBAnyware client software (HBAnyware utility).

The HBAnyware security software is designed to provide two main security features:

1. Prevent remote HBA management from systems in the enterprise that the administrator does not want to have this capability.

2. Prevent an accidental operation (such as firmware download) on a remote HBA. In this case, the administrator does not want to have access to HBAs in systems he or she is not responsible for maintaining.

The first time the HBAnyware Security Configurator is run on a system in an environment where no security as been configured, the initial Access Control Group (ACG) is created. At this point, only this system has remote access to the HBAs in the systems in the ACG. They are no longer remotely accessible from any other system.

Subsequently, additional Access Sub-Groups (ASGs) can be created. This grants systems in the ACG the ability to remotely access the HBAs of other selected systems in the ACG.

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Start the HBAnyware Security Configurator

Before you start the Configurator, you **must** make sure that all of the systems that are part of, or will be part of, the security configuration are online on the Fibre Channel network so that they receive updates or changes made to the security configuration. Any system that is already part of the security installation might not run with the proper security attributes, if updates to the security configuration are made while it is offline. Any system that is part of the security installation and that is offline when the HBAnyware Security Configurator starts will not be available for security configuration changes even if it is brought online while the Configurator is running.

To start the HBAnyware Security Configurator, do the following:

1. Run the /usr/sbin/hbanyware/ssc script. Type:

```
/usr/sbin/hbanyware/ssc
```


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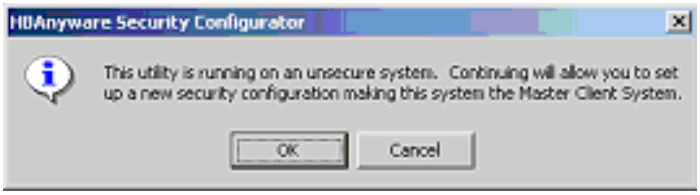
Run the Configurator for the First Time/ Create the ACG

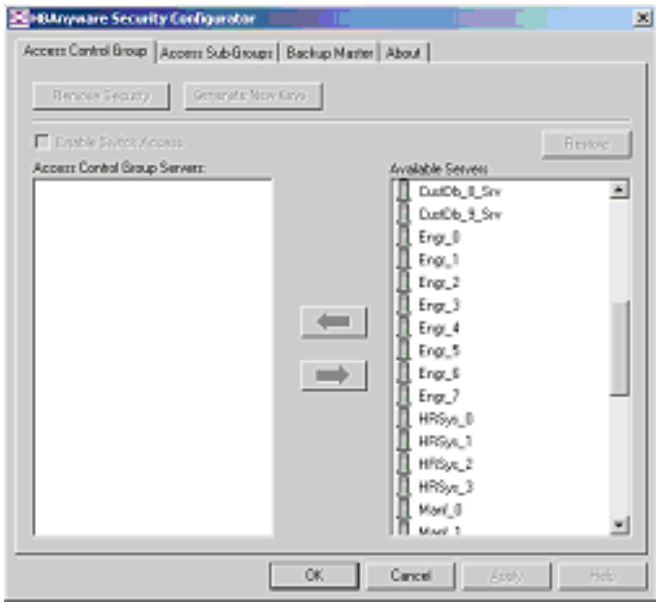
When the HBAnyware Security software is installed on a system and the HBAnyware Security Configurator is run for the first time, that system becomes the Master Security Client (MSC). All of the available servers are discovered and available to become part of the system Access Control Group (ACG). You select the systems to be added to the ACG, and the security configuration is updated on all of the selected servers as well as on the initital system. This selection constitutes the participating platforms in this security installation.

To create the ACG, do the following:

1. Start the HBAnyware Security Configurator for the first time in an unsecure environment. The computer from which you run the Configurator will become the MSC. The following message is displayed:


HBAnyware Security Configurator
This utility is running on an unsecure system. Continuing will allow you to set up a new security configuration making this system the Master Client System.
OK
Cancel

2. Click OK. The Access Control Group tab is displayed.



3. Select the unsecured servers that you want to add to the ACG from the Available Servers list.

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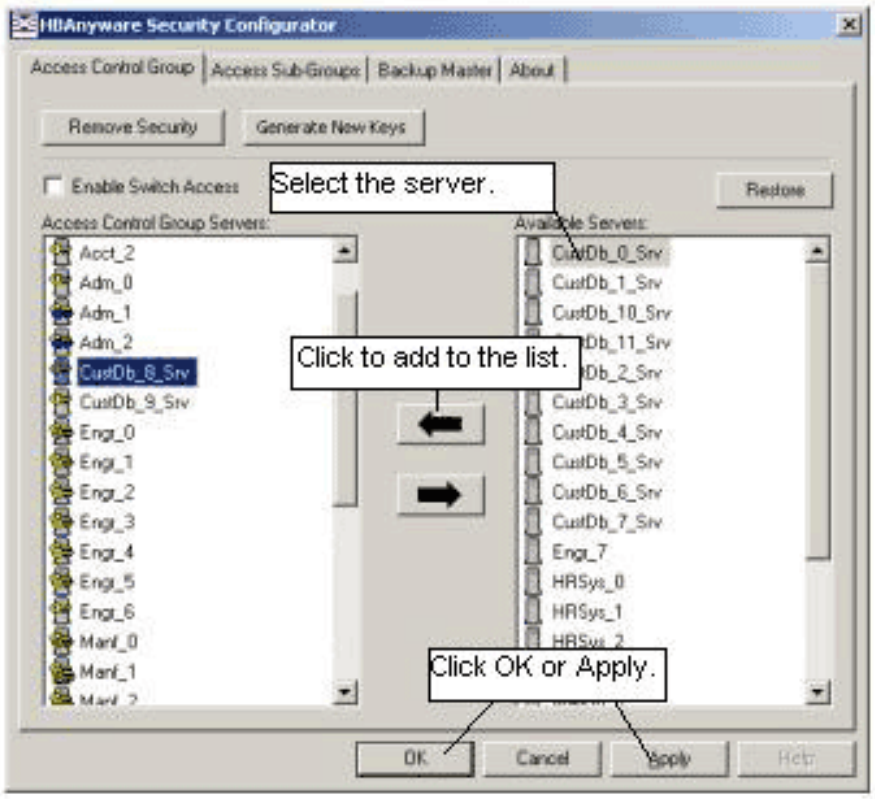

4. Click the left arrow to add the servers to the Access Control Group Servers list.

5. Click OK or Apply.

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Designate an MSC

The first time you run the HBAnyware Security Configurator on any system in a Fibre Channel network, that system becomes the MSC. See Running the Configurator for the First Time for more information.

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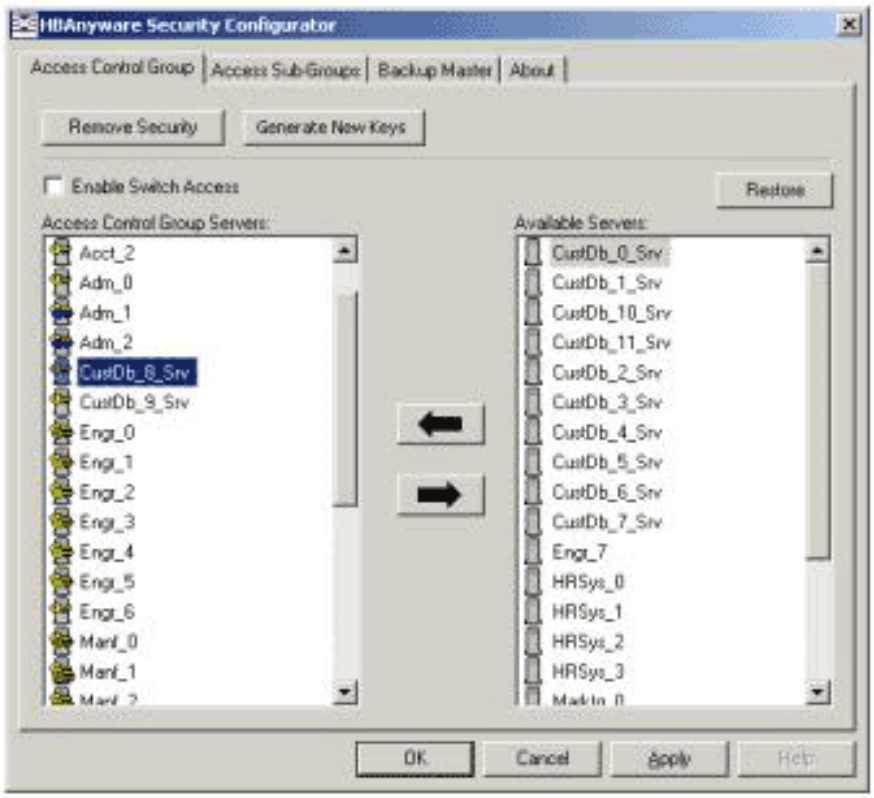
Access Control Groups - Introduction

The Access Control Group tab shows the systems that are part of a client's Access Control Group (ACG) and, from the Master Security Client (MSC), allows you to select the systems that belong to the ACG.

Access Control Group Tab on the MSC

On the MSC, you select or deselect the systems that are to be part of the security installation in the Access Control Group tab. When you select unsecure systems and move them to the Access Control Group Servers list, these systems are updated to secure them and bring them into the MSC's ACG. When you select systems in the ACG and moved them to the Available Servers list, the security configuration for those systems is updated to make them unsecure. After you have configured security from the MSC for the first time, the Access Control Group tab looks similar to the following:



Access Control Group Tab on a Non-MSC

On a non-MSC system, the Access Control Group tab shows the systems that are part of the client's ACG. You cannot modify the ACG on a non-MSC. (You can modify the ACG only on the MSC or a client higher in the security topology's hierarchy.) The ACG tab on a non-MSC system looks similar to the following:

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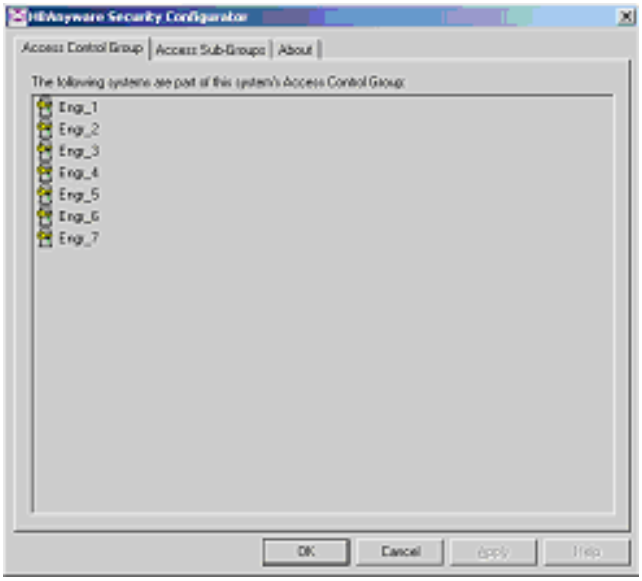

ACG Icons

Depending on the configured security topology, a system can be a server in one or more ACGs. It can also be a client to an ACG. The following icons indicate the state of each of the systems in the Access Control Group Servers list.

The system is a secure server in the ACG. It does not belong to an Access Sub-Group (ASG). You can remove this system from the ACG.

The system is a secure server in the ACG and belongs to one or more ASGs. You can remove this system from the ACG.

The system is a secure server in the ACG and a client to an ASG. You cannot remove this system from the ACG until you remove it as a client from the ASG.

The system is a secure server in the ACG, a secure server in one or more ASGs and a client to an ASG You cannot remove this system from the ACG until you remove it as a client from the ASGs.

The system is a Backup Master. You cannot remove this system from the ACG until you remove it as a Backup Master.

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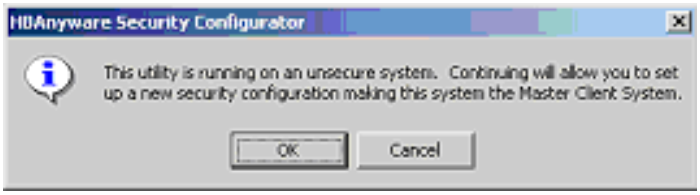
Run the Configurator for the First Time/ Create the ACG

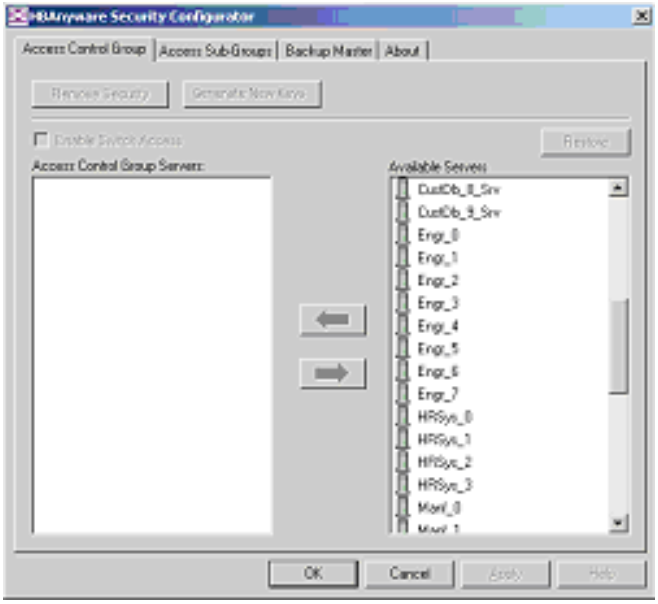
When the HBAnyware Security software is installed on a system and the HBAnyware Security Configurator is run for the first time, that system becomes the Master Security Client (MSC). All of the available servers are discovered and available to become part of the system Access Control Group (ACG). You select the systems to be added to the ACG, and the security configuration is updated on all of the selected servers as well as on the initital system. This selection constitutes the participating platforms in this security installation.

To create the ACG, do the following:

1. Start the HBAnyware Security Configurator for the first time in an unsecure environment. The computer from which you run the Configurator will become the MSC. The following message is displayed:


HBAnyware Security Configurator
This utility is running on an unsecure system. Continuing will allow you to set up a new security configuration making this system the Master Client System.
OK
Cancel

2. Click OK. The Access Control Group tab is displayed.



3. Select the unsecured servers that you want to add to the ACG from the Available Servers list.

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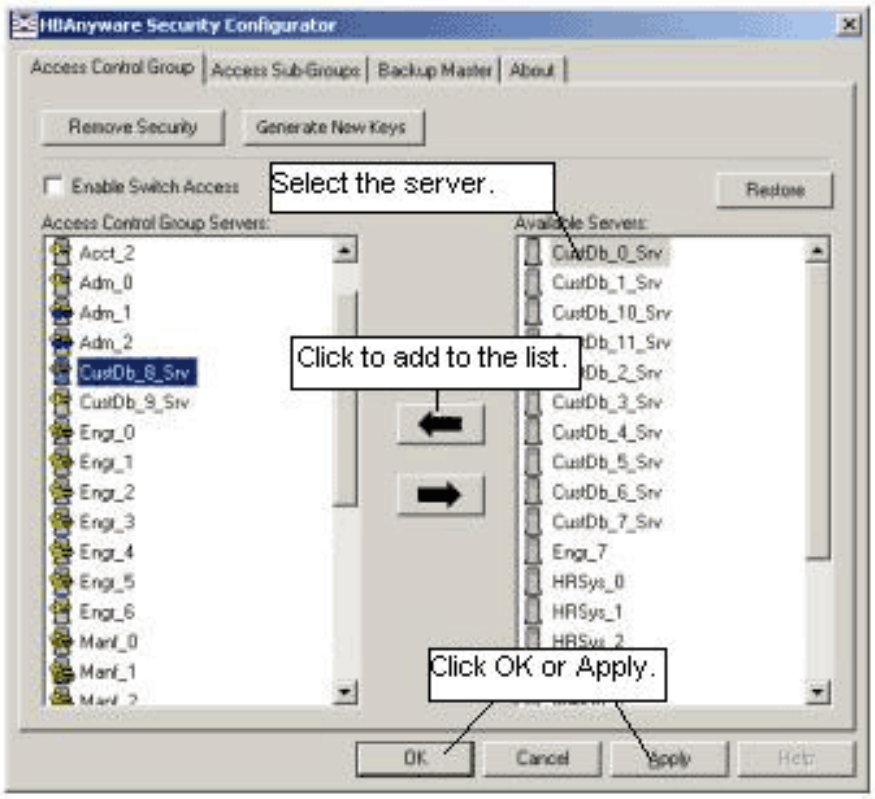

4. Click the left arrow to add the servers to the Access Control Group Servers list.

5. Click OK or Apply.

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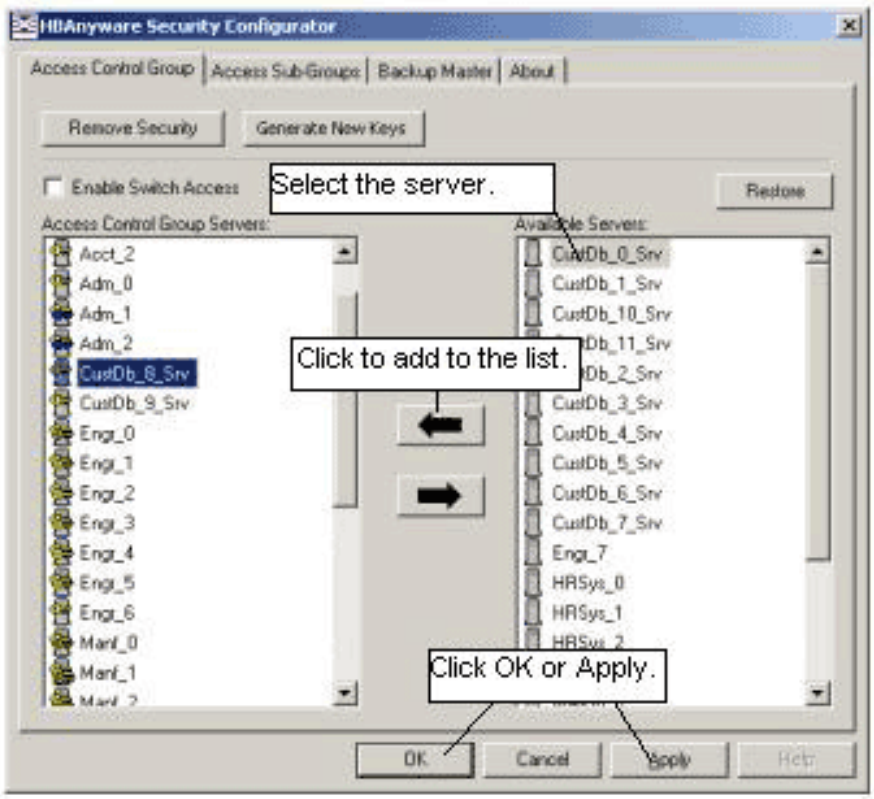
Add a Server to the ACG

After you create the initial Access Control Group (ACG) on the Master Security Client (MSC), you may want to add unsecured servers to the ACG.

To add servers to the ACG, do the following:

1. Start the HBAnyware Security Configurator.

2. On the Access Control Group tab, from the Available Servers list, select the unsecured servers that you want to add to the ACG.



3. Click the left arrow to add the server to the Access Control Group Servers list.

4. Click OK or Apply.

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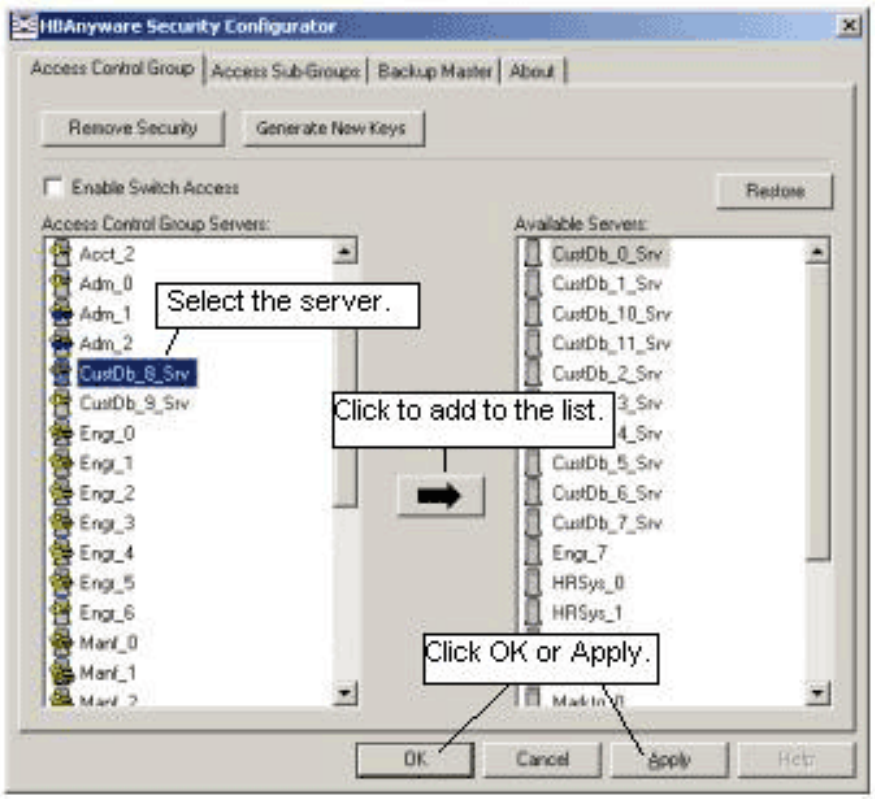
Delete a Server from the ACG

To delete a server from the Access Control Group (ACG), do the following:

1. Start the HBAnyware Security Configurator.

2. On the Access Control Group tab, from the Access Control Group Servers list, select the secured systems that you want to delete from the ACG.



3. Click the right arrow to remove the servers from the Acces Control Group Servers list.

4. Click OK or Apply.

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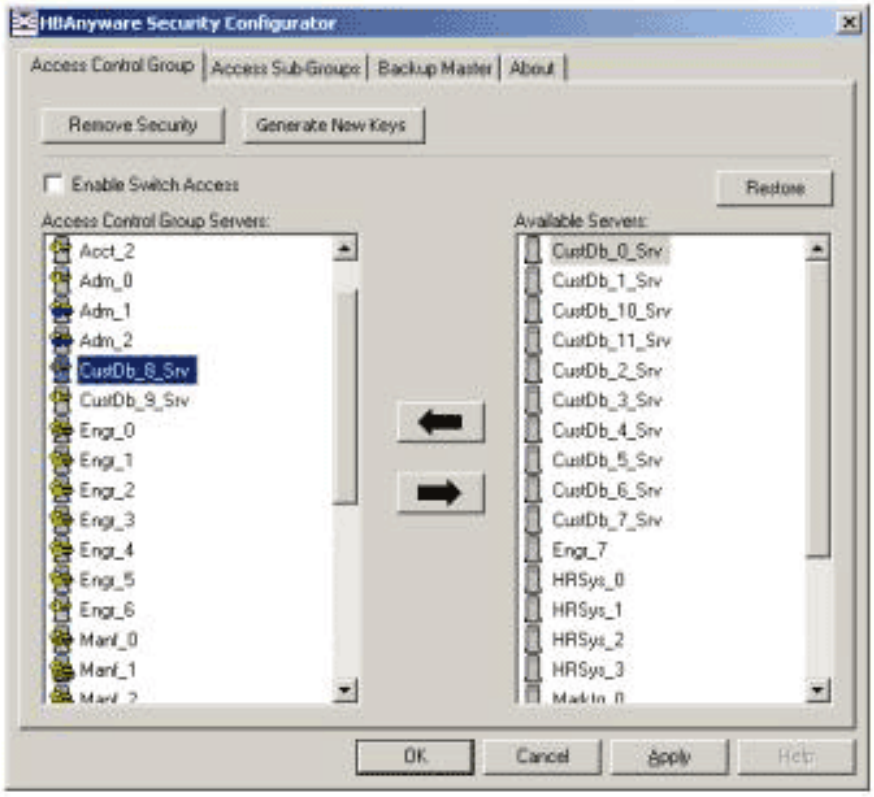
Remove Security from all Servers in the ACG

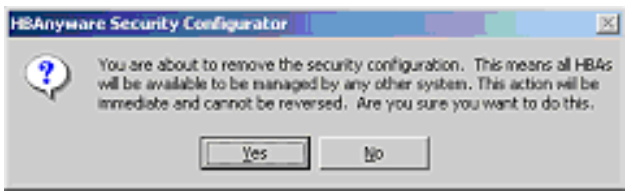
You can remove security from all systems only from the Master Security Client (MSC). Removing the entire security topology on all of the servers in the MSC's ACG puts the servers in an unsecure state. The MSC is also put in an unsecure state; consequently, it is no longer the MSC. Any participating systems that are not online will not receive the 'remove security' configuration update, and as a result will no longer be accessible remotely.

To remove security from all servers in the AGC, do the following:

1. Start the HBAnyware Security Configurator. The Access Control Group tab is displayed.



2. On the Access Control Group tab, click the Remove Security button. The following message is displayed:


HBAnyware Security Configurator
You are about to remove the security configuration. This means all HBAs will be available to be managed by any other system. This action will be immediate and cannot be reversed. Are you sure you want to do this.
Yes
No

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3. Click Yes. Security is removed from all servers in the ACG.

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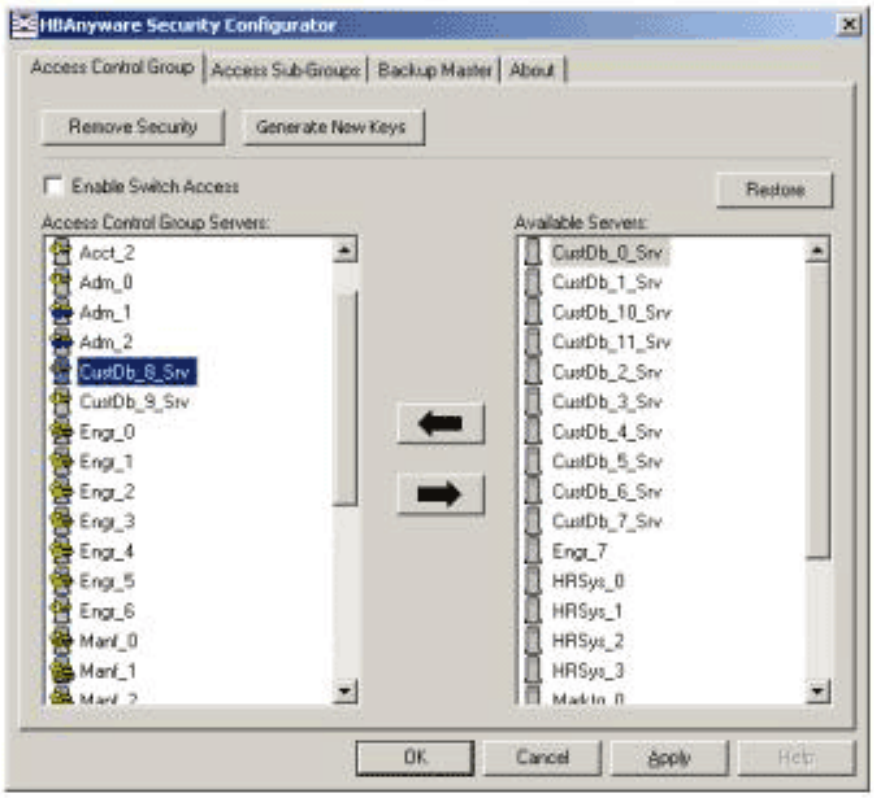
Generate New Security Keys

You can generate new security keys only from a Master Security Client (MSC). After the new security keys are generated, they are automatically sent to all of the remote servers in the Access Control Group (ACG).

Note All the servers that are part of the ACG must be online when this procedure is performed so that they may receive the new keys. Any servers that do not receive the new keys will no longer be accessible remotely.

To generate new security keys for all servers in the ACG, do the following:

1. From the MSC, start the HBAnyware Security Configurator. The Access Control Group tab is displayed.



2. On the Access Control Group tab, click the Generate New Keys button. A dialog box warns you that you are about to generate new security keys for all systems.

3. Click Yes. The new keys are generated and sent to all of the remote servers in the ACG.

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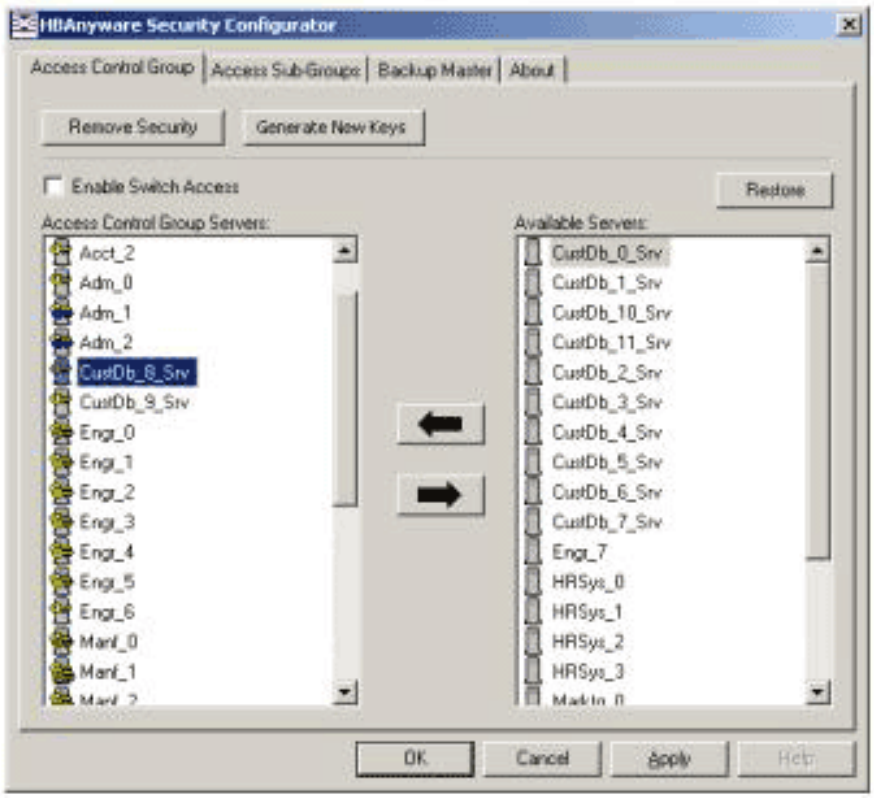
Restore the ACG to Its Last Saved Configuration

You can restore the ACG to its last saved configuration, if there are unsaved changes to the ACG, only from the Master Security Client (MSC).

To restore the ACG to its last saved configuration, do the following:

1. From the Access Control Group tab on the MSC, click the Restore button.



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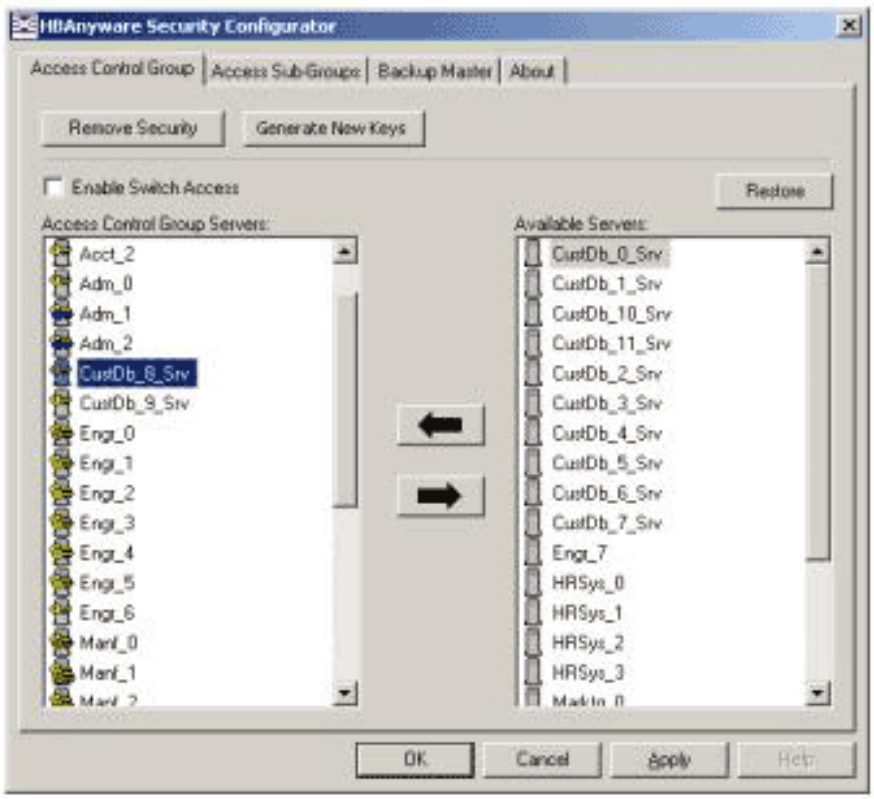
Access a Switch

You can enable switch access only on a Master Security Client (MSC). Switch access grants the client access rights to a switch to remotely access HBAs on servers in the Access Control Group (ACG).

To enable switch access, do the following:

1. Start the HBAnyware Security Configurator.

2. From the Access Control Group tab, check Enable Switch Access.



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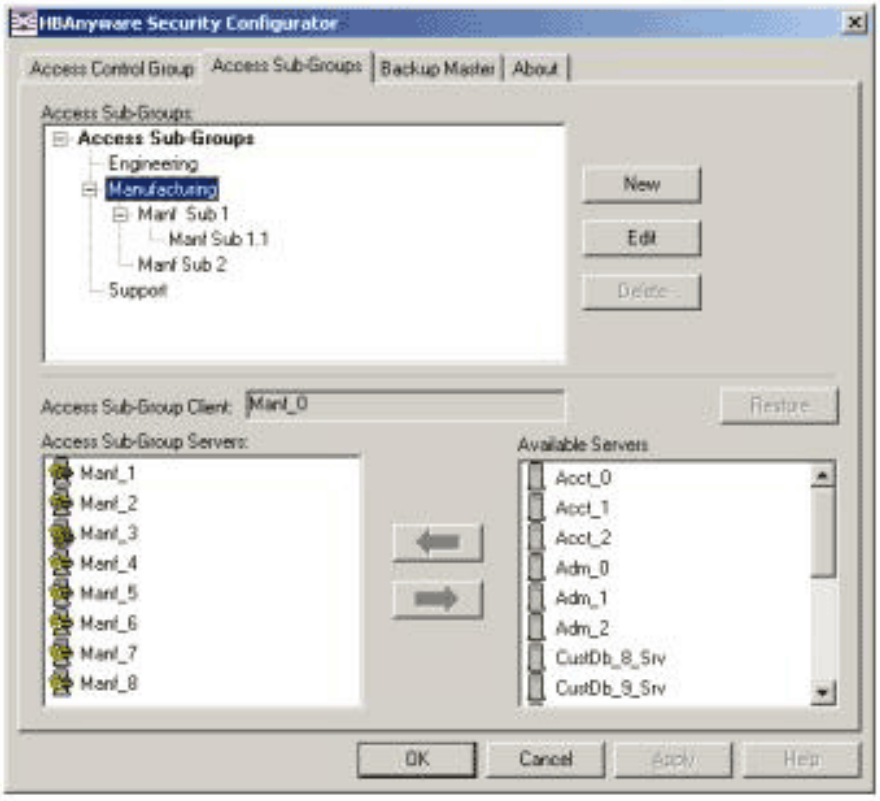
Access Sub-Groups - Introduction

The Access Sub-Group tab allows you to create multiple Access Sub-Groups (ASGs) and multiple levels (tiers) in the security topology hierarchy. The hierarchy can be as many levels deep as desired. However, it is recommended the hierarchy extend no more than three levels deep, as it becomes increasingly difficult to keep track of the topology the deeper it goes. The hierarchy of ASGs is displayed in the Access Sub-Groups tab as a tree. You can create, modify and deleted ASGs at each level in this tree.



ASG Icons

The following icons indicate the state of each of the servers in the Access Sub-Group Servers list.

The system is a server in the ASG but not in any child ASGs. You can remove it from the ASG.

The system is a server in the ASG and at least one child ASG. You cannot remove it from the ASG until you remove it from the child ASGs.

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The system is a server in the ASG and a client to a child ASG. You cannot remove it from the ASG until you remove it as a client from the child ASG (by either deleting or editing the child ASG).

The system is a server in the ASG, a server in at least one other child ASG and a client to a child ASG. You cannot remove it from the ASG until you remove it from the child ASGs and as a client from the child ASG (by either deleting or editing the child ASG).

The system is a server in the ASG and a client to a non-child ASG. You can remove it from the ASG.

The system is a server in the ASG, a server in at least one child ASG, and a client to a non-child ASG. You cannot remove it from the ASG until you remove it removed from the child ASGs.

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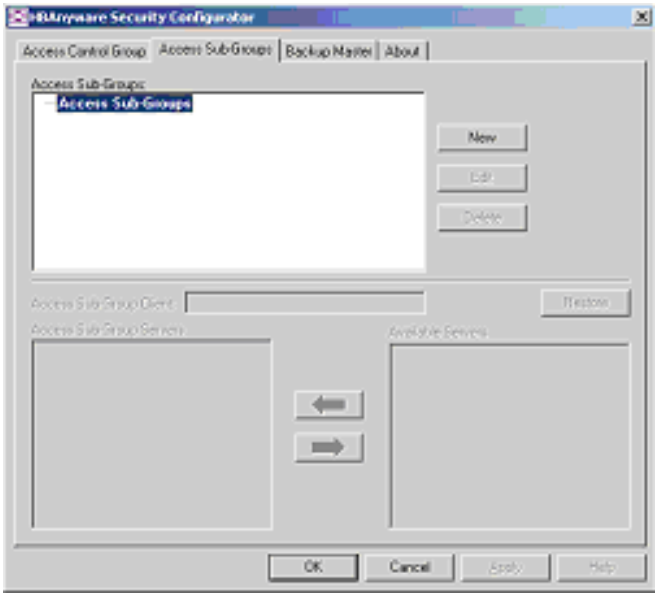
Create an ASG

You create a new Access Sub-Group (ASG) by selecting one system from the Access Control Group (ACG) to be the client, and some or all of the other systems to be servers to this client, thus defining the new client's ACG. When the HBAnyware Security Configurator is run on the new client, the displayed ACG shows the servers that were configured in the ASG by its parent client.

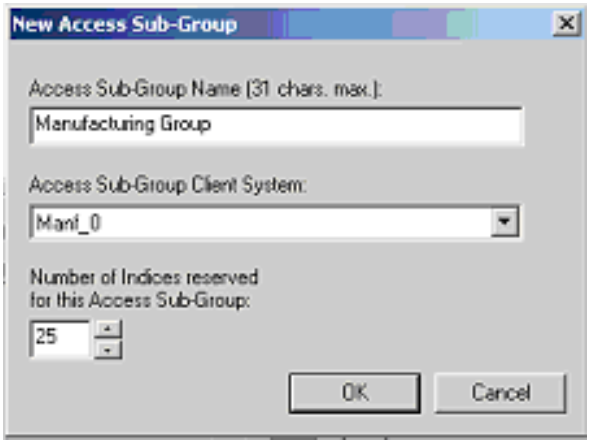
To create an ASG, do the following:

1. Start the HBAnyware Security Configurator.

2. Click the Access Sub-Groups tab.



3. Click New. The New Access Sub-Group dialog box is displayed.



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4. Enter the ASG information:

   - Access Sub-Group Name: Enter the name of the ASG. The ASG name is for identification purposes only. It does not provide any security function. Provide a name that will make it easy to remember the systems that are part of the ASG.

     The name can contain any alphanumeric characters, symbols or spaces (up to 31). At each level of the security topology, each ASG name must be unique. If the name is not unique at its level, an error message informs you of this when you press OK.

   - Access Sub-Group Client System: Select the system that is to be the client.

   - Number of indices reserved for this Access Sub-Group: Select the number of 'indices' you want to reserve for the client system of the new ASG. This number reflects the number of subsequent 'child' ASGs that can subsequently be created on the new client's system. See the Reserved Indices topic (under Access Sub-Groups in this manual) for examples.

5. Click OK in the New Access Sub-Group dialog box. The ASG is created.

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Reserved Indices - Examples

A particular security installation can support the creation of several hundred access groups (ACGs and ASGs). When you create each new access group, you allocate some number of 'indices' to the client system of the new ASG. This number reflects the number of subsequent 'child' ASGs that can subsequently be created at the new client's system.

- If zero indices are reserved, you cannot create any lower-level ASG under the client of the new ASG. Thus, for example, if you want to implement a multi-tiered security architecture consisting of many ASGs, and you wanted to create them all from the Master Security Client (MSC), zero indices would be allocated to each of the new ASGs client platforms when they are created.

- If you create an ASG, and you reserve 25 indices for the new ASG client platform, a child ASG created by this platform will have a maximum of only 24 indices available to be reserved (one is taken by the creation of the child ASG itself). This continues down the ASG hierarchy as each lower level ASG is created.

- When you create an ASG from the MSC, a maximum of 50 indices (or less if fewer are available) can be reserved. For all other clients, the maximum depends on how many indices were reserved to that client when its ASG was created, and on how many it has subsequently allocated to its ASGs.

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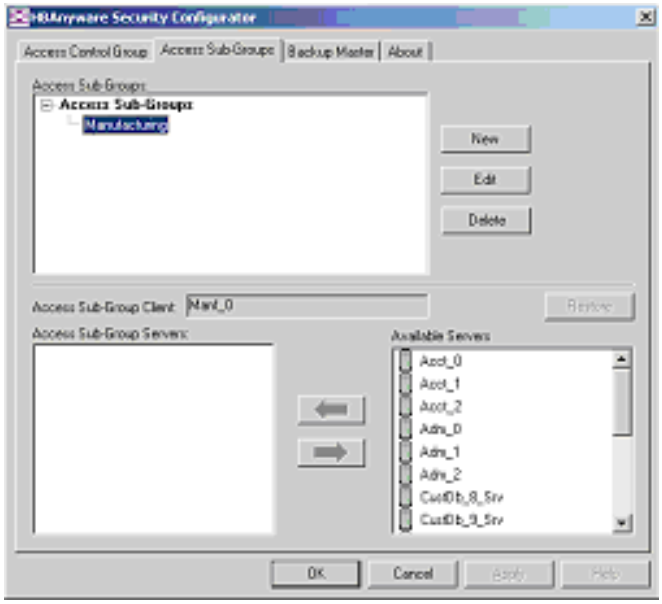
Add a Server to an ASG

To add a server to an ASG:

1. Start the HBAnyware Security Configurator.
2. Click the Access Sub-Group tab.



3. The name of the ASG is displayed in the Access Sub-Groups tree. From the Available Servers list, select the servers to be added to the ASG.
4. Click the left arrow to move the servers to the Access Sub-Group Servers list.
5. Click OK or Apply to update servers, adding them to the ASG. The new client can remotely manage the HBAs on those servers using the HBAnyware utility.

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Deleting an ASG

Only a leaf node ASG may be deleted (i.e. not ASGs underneath it in the tree). If an ASG has at least one child ASG, those child ASGs must be deleted first.

To delete an ASG:

1. From the Access Sub-Group tree, select the leaf node ASG you wish to delete.
2. Press the Delete button. A dialog box appears warning you that if you continue the access sub-group will be deleted.
3. Click Yes. This operation is immediate. There is no need to press the OK or Apply button under the tab.

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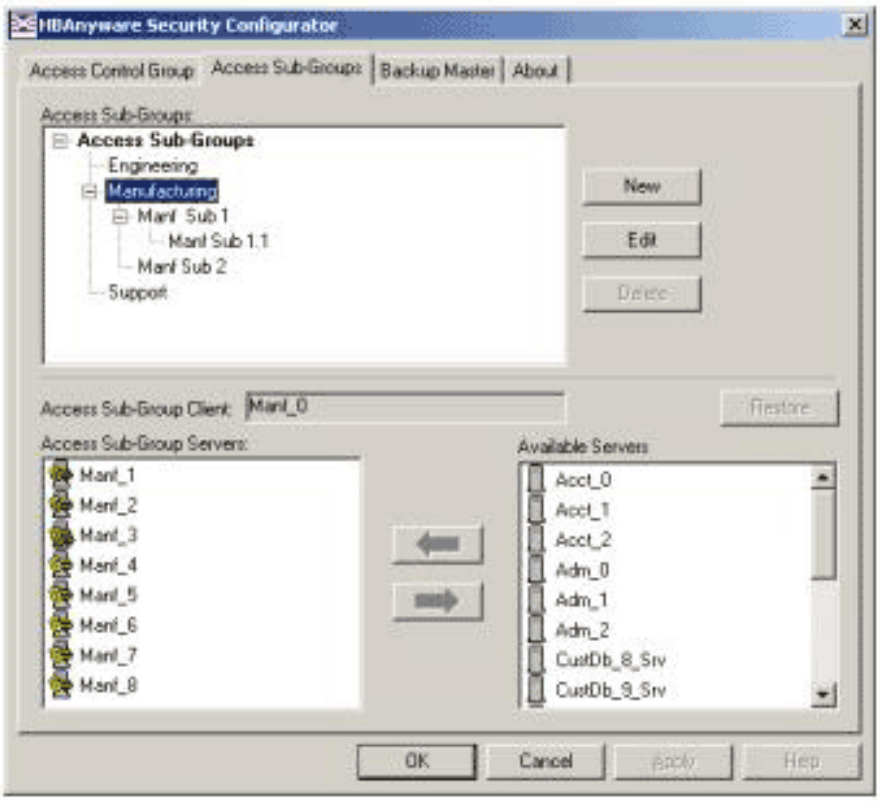
Restore an ASG to Its Last Saved Configuration

You can restore an Access Sub-Group (ASG) to its last saved configuration if there are unsaved changes to it. To restore an ASG to its last saved configuration, do the following:

1. Click the Access Sub-Group tab.



2. Select the ASG whose configuration you want to restore.

3. Click Restore.

4. Click OK or Apply to save your changes.

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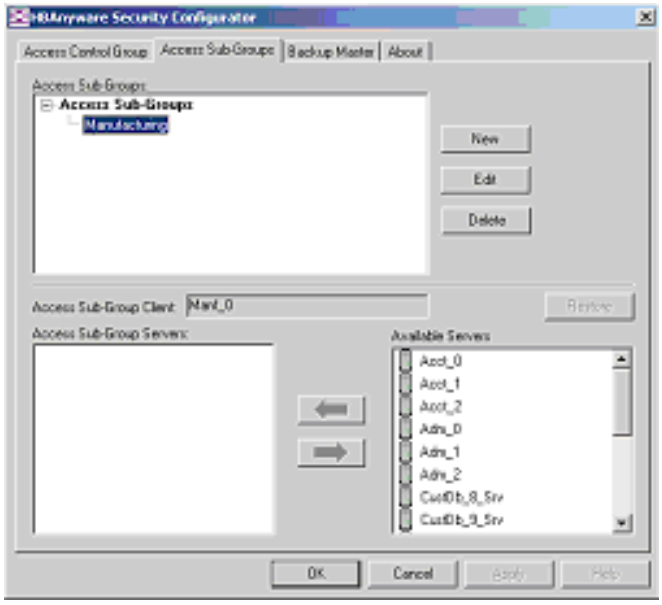
Edit an ASG

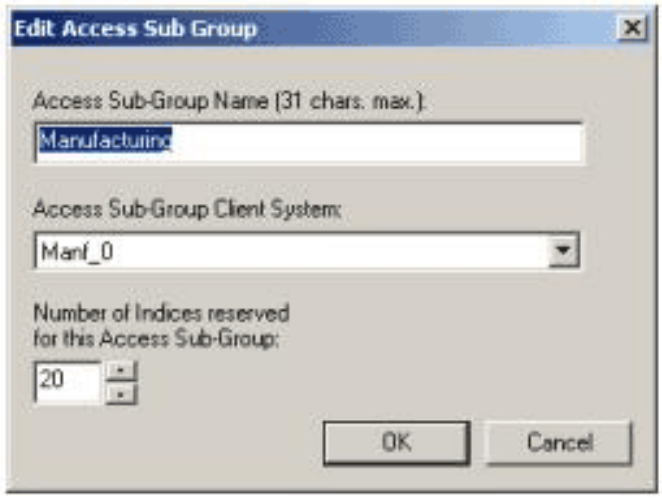
You can change the name, client system or reserved indices of an Access Sub-Group (ASG).

To edit an ASG, do the following:

1. Start the HBAnyware Security Configurator.
2. Click the Access Sub-Group tab.



3. Select the ASG you want to edit.
4. Click Edit. The Edit Access Sub-Group dialog box is displayed.



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5. Change the ASG information:

   - Access Sub-Group Name: Change the name of the ASG. The ASG name is for identification purposes only. It does not provide any security function. Provide a name that will make it easy to remember the systems that are part of the ASG.

     The name can contain any alphanumeric characters, symbols or spaces (up to 31). At each level of the security topology, each ASG name must be unique. If the name is not unique at its level, an error message informs you of this when you press OK.

   - Access Sub-Group Client System: Select the new system that is to be the client. If the Configurator is running on a system connected to more than one fabric, the client list contains only those systems that can be accessed by the original client of the ASG.

   - Number of indices reserved for this Access Sub-Group: Select the new number of 'indices' you want to reserve for the client system of the new ASG. This number reflects the number of subsequent 'child' ASGs that can subsequently be created on the new client's system. See the Reserved Indices topic (under Access Sub-Groups in this manual) for examples.

6. Click OK in the Edit Access Sub-Group dialog box to save your changes.

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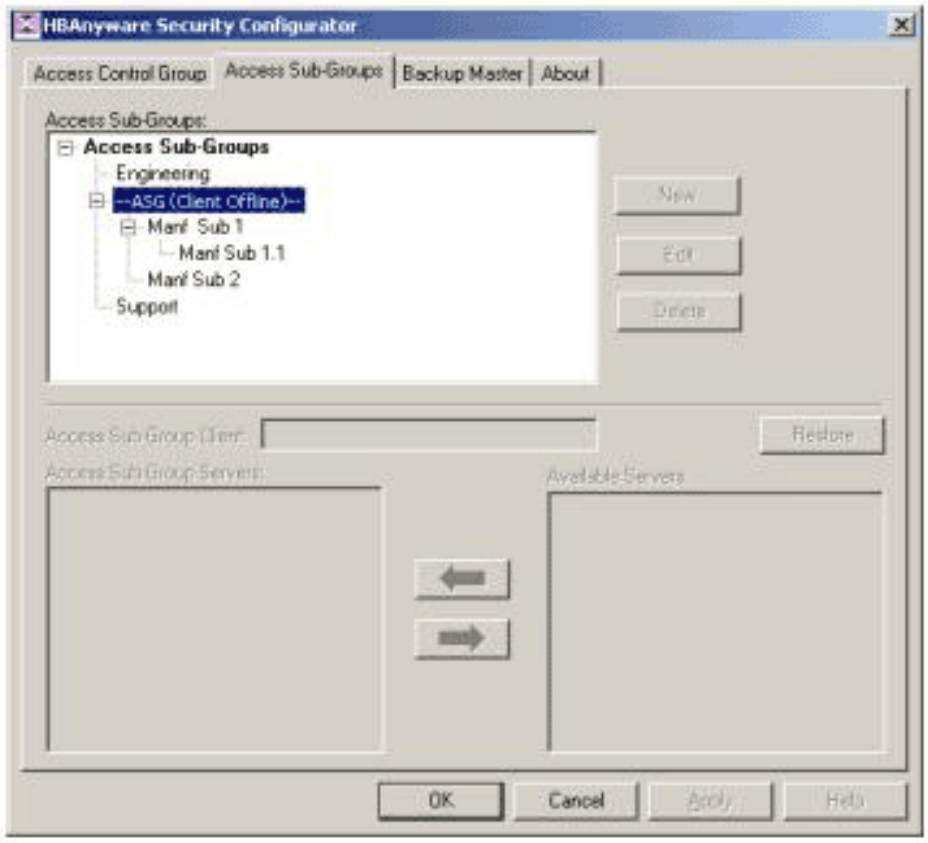
About Offline ASGs

Sometimes a client system may not be online when the HBAnyware Security Configurator is running. In this case, the Access Sub-Group (ASG) for the client appears offline in the ASG tree, much like the following:



The offline ASG entry serves as a placeholder for where the real ASG would be in the tree. You cannot modify or delete the entry (although it is removed from the display if all of its child ASGs are deleted).

It is possible to delete the child ASGs of an offline ASG. However, it is recommended that you delete them only if the client for the offline ASG will never be put online again. It is best to delete child ASGs when the parent ASG is online.

If you choose to delete a child ASG, the operation is immediate. There is no need to press OK or Apply.

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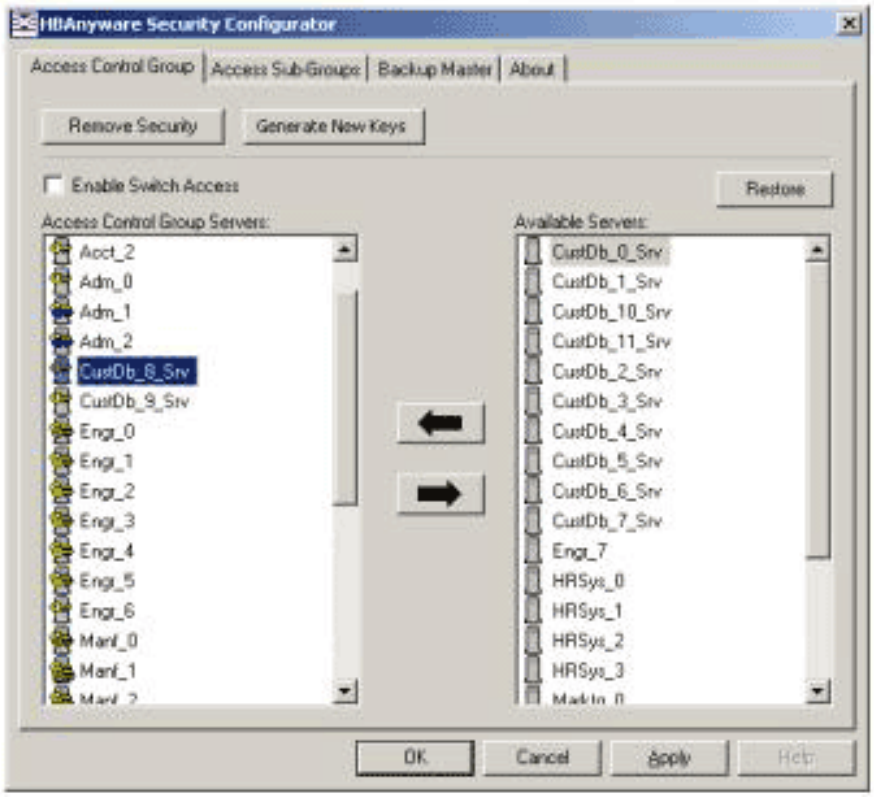
Backup Masters - Introduction

A Backup Master mirrors the security data of the Master Security Client (MSC) in case it has to take over as the MSC if the MSC becomes unable to operate or is removed from the security configuration. A Backup master system receives all the updates to the security configuration on the MSC. However, you cannot make modifications to the security configuration on a Backup Master.

When the Configurator runs on a Backup Master, the Access Control Group tab looks like the tab on a non-MSC system. The Access Sub-Group tab displays the ASGs, but you cannot change the ASGs.



The Backup Master tab is available only when the HBAnyware Security Configurator is running on the MSC or a Backup Master. Use this tab to set up a system as a Backup Master to the MSC and to replace the MSC with a Backup Master.

Each time the HBAnyware Security Configurator is started on the MSC and no Backup Master is assigned, a message warns you that no Backup Master Client is assigned to the security configuration.

If you run the HBAnyware Security Configurator on a Backup Master, a message warns you that you can only view security information on a Backup Master. Security changes must be made to the MSC.

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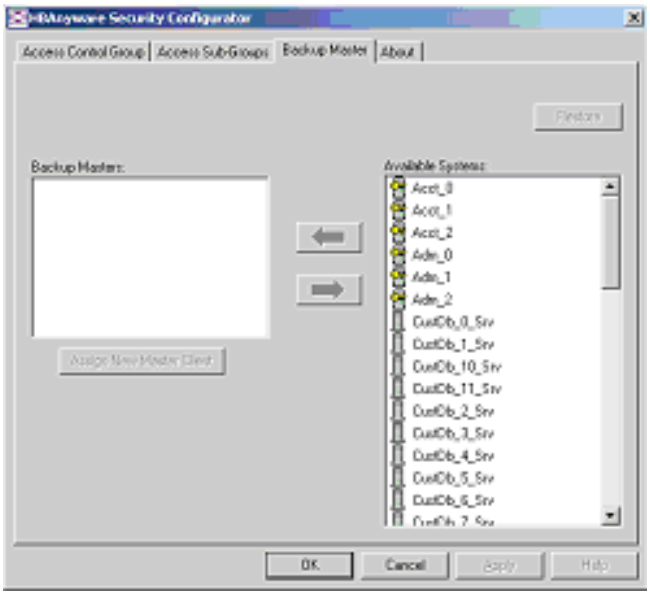
Because a Backup Master system receives all the updates that the MSC makes to the security configuration, it is very important that the Backup Master is online when the HBAnyware Security Configurator is running on the MSC. Otherwise, updates to the security configuration are not reflected to the Backup Master. If the Backup Master then becomes the MSC, the security configuration may be corrupted.

Backup Master Eligible Systems

In order to be eligible to become a Backup Master, a system must not be a client or server in any ASG. In other words, it must be either a server in the MSC's Access Control Group (ACG) or an unsecure system. If it is an unsecure system, it will be secure when it becomes a Backup Master.

Backup Master Tab and Controls

The first time the Backup Master tab is selected on the MSC, it looks similar to the following:



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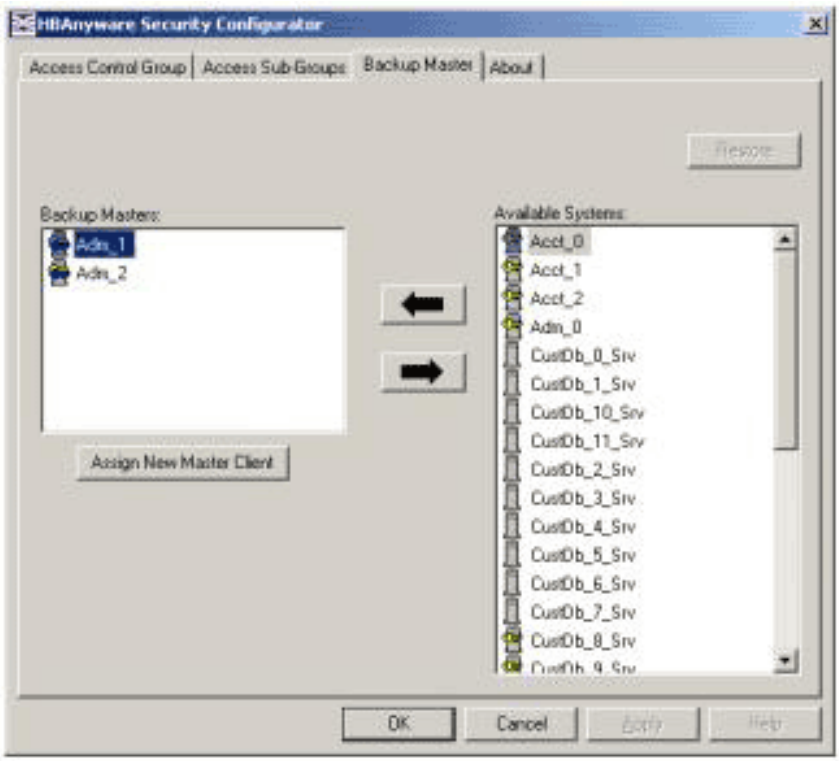
Create a Backup Master

To create a Backup Master, do the following:

1. On the Master Security Client (MSC), start the HBAnyware Security Configurator.
2. Click the Backup Master tab.



3. Select a system from the Available Systems list.
4. Click the left arrow to move the system to the Backup Masters list.
5. Click OK or Apply to save your changes.

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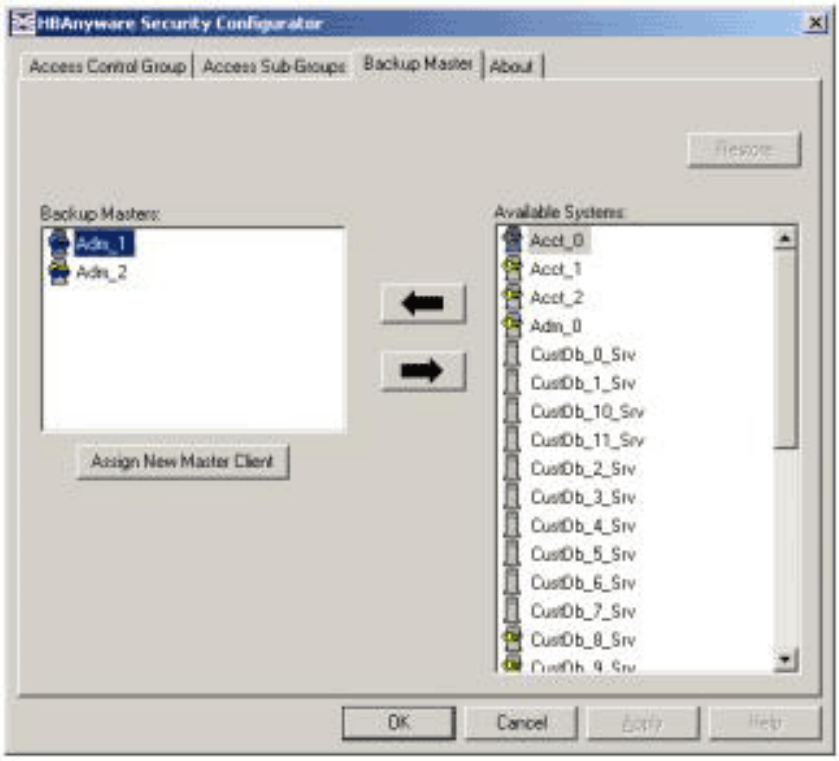
Reassign a Backup Master as the New MSC from the Old MSC

Because a Backup Master may have to take over as the Master Security Client (MSC), it should be able to physically access all of the HBAs that the MSC can access. If the MSC is connected to multiple fabrics, its Backup Master should be selected from the Available Systems list that is connected to the same fabrics as the MSC.

To reassign a Backup Master as the new MSC from the old MSC, do the following:

1. On the MSC, start the HBAnyware Security Configurator.
2. Click the Backup Master tab.



3. In the Backup Masters list, select the Backup Master system that you want to reassign as the MSC.
4. Click Assign New Master Client. You will be asked if you wish to proceed.
5. Click Yes. The selected Backup Master becomes the new MSC. The current MSC becomes a server in the new MSC's ACG. After the changes are made, a message indicates that the reassignment is complete.
6. Click OK. The Configurator closes because the system is no longer the MSC.

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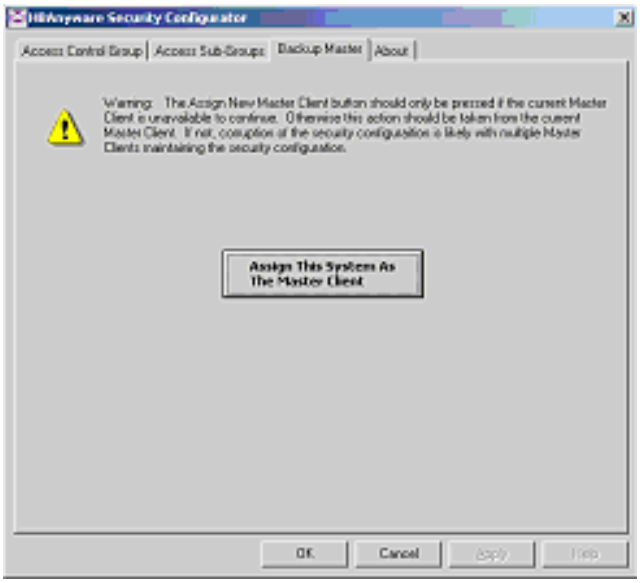
Reassign a Backup Master as the New MSC from the Backup Master

Warning Use this method only if the MSC cannot relinquish control to a Backup Master. For example, if the MSC is no longer bootable or able to connect to the Fibre Channel network. Under any other circumstances, if the Backup Master takes over as the MSC, and the MSC is still running or comes back online later, there will be two MSCs for the same security configuration. This will eventually lead to corruption of the security configuration.

To reassign a Backup Master as the new MSC from the Backup Master, do the following:

1. On the Backup Master system that you want to reassign as the MSC, start the HBAnyware Security Configurator.

2. Click the Backup Master tab.



3. Click Assign This System As The Master Client. A prompt asks if you want to continue.

4. Click Yes. A prompt notifies you that this system is now the new MSC.

5. Click OK. The Configurator closes. Restart the HBAnyware Security Configurator to run the former Backup Master as the MSC.

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Emulex Driver for Linux Troubleshooting Manual

Version 2.01g

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  - ELS Events
  - Link Discovery Events
  - Mailbox Events
  - Initialization Events
  - IP Traffic History
  - FCP Traffic History
  - Node Table Events

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FCP Target Mode Events
Miscellaneous Events
Link Events
SLI Events
IOCTL Events

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Introduction

There are several circumstances in which your system may operate in an unexpected manner. The Troubleshooting manual explains many of these circumstances and offers one or more workarounds for each situation.

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Cannot Install the Security Configurator

Situation:

The HBAnyware Security Configurator software package will not install. An error message states that the latest version of HBAnyware must be installed first.

Resolution:

The system either has no HBAnyware software installed or has an older version of the HBAnyware software installed. In either case, obtain the latest version of the HBAnyware software and follow the installation instructions. Remember to install the HBAnyware software before installing the HBAnyware Security Configurator package.

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Operating Error Occurs When Attempting to Run HBAnyware

Situation: When you attempt to run HBAnyware, an operating system error may occur. The computer may freeze and require restarting to make the computer operational.

Resolution: Perform the installation tasks in the following order:

1. Install the Linux driver (see the online Installation manual).
2. Install the utilities (see the online Installation manual).

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Cannot See Other HBAs or Hosts

Situation:

Although HBAnyware is installed, only local host bus adapters (HBAs) are visible. The other HBAs and hosts in the SAN cannot be seen.

Resolution:

HBAnyware uses in-band data communication, meaning that the management server running HBAnyware must have a physical Fibre Channel connection to the SAN. All the HBAs in the SAN will be visible if:

1. The other servers have a Fibre Channel connection to your zone of the SAN.
2. All other HBAs are running HBAnyware and the appropriate driver.
3. The other HBAs are Emulex HBAs.

Note	HBAnyware must be running on all remote hosts that are to be discovered and managed. Remote capabilities of HBAnyware are subject to fabric zoning configuration. Remote hosts to be discovered and managed by HBAnyware must be in the same zone.

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Cannot See Multiple Zones from the Management Server

Situation:

Cannot see multiple zones on the same screen of my management server running HBAnyware.

Resolution:

Provide a physical Fibre Channel connection into each of the zones. For each zone you want to see, connect an Emulex HBAnyware enabled port into that zone.

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SAN Management Workstation Does Not Have a Fibre Channel Connection

Situation:

The SAN management workstation does not have a physical Fibre Channel connection into the SAN because the other management tools are all out-of-band. Can HBAnyware be run on this SAN management workstation?

Resolution:

From the SAN management workstation, run a terminal emulation session into one of the servers that has HBAnyware loaded on it. For Windows servers, use the operating system's terminal services option. On Solaris or Linux servers, open an X-Windows session to run the server's HBAnyware GUI remotely.

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Cannot See New LUNS

Situation:

Although new LUNS were created on the storage array, they do not appear in HBAnyware.

Resolution:

Refresh the screen.

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HBAnyware Appears on Remote Servers in the SAN

Situation:

HBAnyware appears on remote servers in the SAN.

Resolution:

To prevent HBAnyware from appearing on remote servers in the SAN, do one of the following:

- In Windows, disable the HBAnyware service.
- In Solaris, disable the rmserver process.
- In Linux, disable the rmserver process.

Disabling this service or process prevents the local servers from being seen remotely.

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Cannot Access Formerly Accessible Servers Via the HBAnyware Security Configurator or the HBAnyware Utility

Situation:

Cannot Access Formerly Accessible Servers Via the HBAnyware Security Configurator or the HBAnyware Utility

Resolution:

This is actually a symptom of two different problems. See the following troubleshooting topics in the MSC section of this manual:

- New Keys Were Generated While Servers Were Offline
- Security Removed While Servers Were Offline

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All Servers Are Not Displayed

Situation:

When I run the HBAnyware Security Configurator on the MSC, I do not see all of the systems in Available Servers or Access Control Group Servers lists.

or

When I run the HBAnyware Security Configurator on a non-MSC, I do not see all of the systems I should see in the Access Control Group Servers list.

Resolution:

Make sure all of the systems are connected to the Fibre Channel network and are online when you start the Configurator. Discovery of the systems is done only once, at startup. Unlike the HBAnyware utility, there is no Rediscover Devices button. Therefore, the Configurator must be restarted to rediscover new systems.

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Cannot Add or Remove a Server

Situation:

The HBAnyware Security Configurator shows only a list of the systems in this system's ACG. I cannot add or remove systems from the ACG.

Resolution:

This is normal. You can modify the ACG for your system only on the MSC or on a parent client system.

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HBAnyware Utility Shows Non-ACG Servers

Situation:

The HBAnyware utility shows servers that are part of the ACG and that are not part of the ACG.

Resolution:

The HBAnyware utility discovers unsecured servers as well as servers that are part of its ACG. The servers that you see that are not part of the ACG are unsecured. They will be discovered by any system running the HBAnyware utility on the same Fibre Channel fabric.

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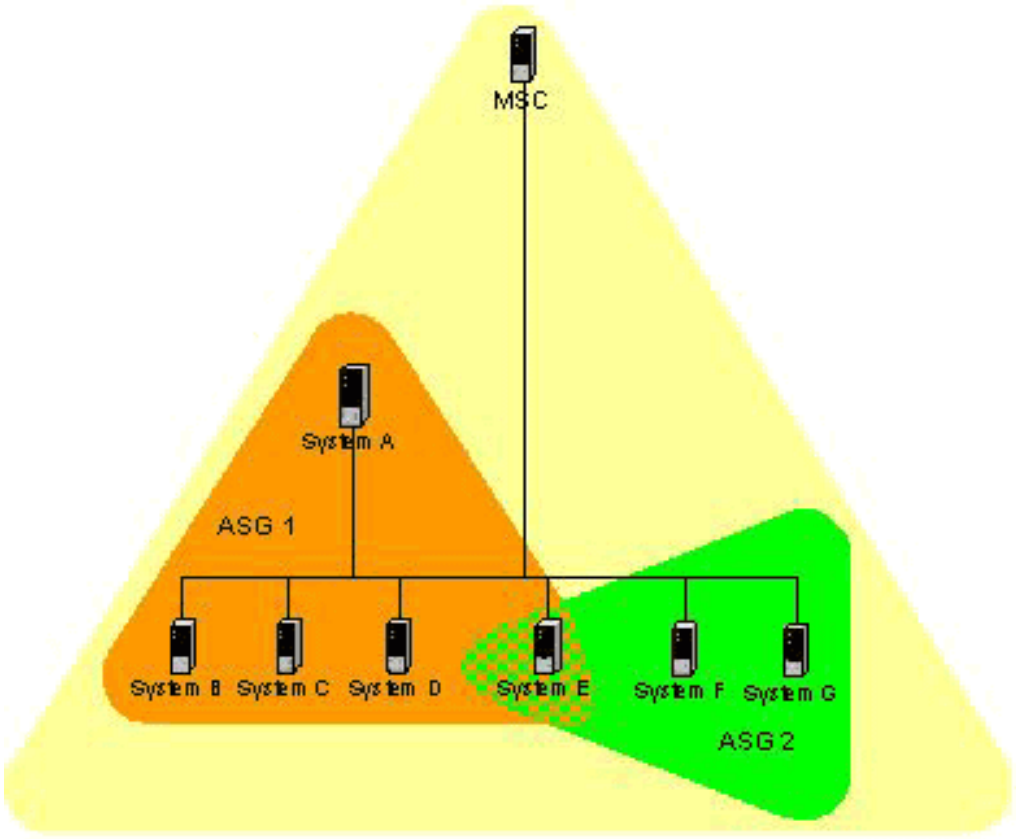
ASG Appears to Be Non-Hierarchical

Situation:

It is possible from a higher-level client (such as the MSC) to create an ASG 1 with system A as the client and systems B, C, D, and E as servers. Then create an ASG 2 with system E as the client, but with systems F and G as servers even though F and G are not part of ASG 1. This makes the topology non-hierarchical.

Resolution:

This scenario is shown in the following picture:



System E is part of ASG 1, but has been made a client of ASG 2, and both of the servers in ASG 2 are not part of ASG 1. You could not create this ASG on system A, but you could on the MSC (or on a parent client) because it can access systems F and G. Although not shown in the picture, it is also be possible to make system A a server in ASG 2, creating a case where system A and system E are both clients and servers to/of each other.

While the Configurator will allow you to set up ASGs this way, it is best not to create a topology like this as it can lead to confusion. The best way to set up an ASG is to set up

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the ASG on the MSC (or a higher-level parent) where the clients and servers do not cross over into other ASGs like in the picture. Then let the set up ASGs on clients of those ASGs in the same manner, keeping the topology hierarchical.

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Cannot Add or Remove a Server

Situation:

You cannot add or remove a server.

Resolution:

When all of the systems in an ACG are running on a single fabric, they are all available to be added to any ASG. However, if the client is connected to more than one fabric, it is possible that not all of the servers in the client's ACG are physically accessible by a chosen client for an ASG. In this case, those servers are not available to be added to that ASG.

If you add a system to an ASG as a server, and then make the system a client to a child ASG, you cannot remove it from the ACG it belongs to as a server until you delete the ASG that it is a client to.

Before you delete a server from an ASG, you must first remove the server from any lower level ASGs to which it belongs.

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The Label in the ASG Display Shows "- ASG (Client Offline) -"

Situation:

In the ASG tree of the Access Sub-Groups tab, one or more of the names of the ASGs is displayed as "- ASG (Client Offline) -"

Resolution:

The client system for the ASG was not discovered when the Configurator was started. See the following troubleshooting topics:

- All Servers Are Not Displayed
- New Keys Were Generated While Servers Were Offline

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Not All Servers Are Available to an ASG

Situation:

When you create a new ASG or modify an existing ASG, not all of the servers in the ACG are available to be added to the ASG.

Resolution:

A client system can be connected to more than one fabric. While the system the Configurator is running on may be able to access all of the servers in its ACG, it is not necessarily the case that the selected client for the ASG can access all of the servers. Only those that can be accessed by the selected server will be available.

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Cannot Create a Backup Master

Situation:

You cannot create a Backup Master.

Resolution:

You select a system (or group of systems) from the MSC to be the Backup Master. The system must be either an unsecured system (which will be secured by being made a Backup Master), or a system that is not part of any ASG (client or server). These systems will mirror the MSC's security configuration.

Because the Backup Master may some day take over as the MSC, the Backup Master must be able to physically access all of the systems that the MSC can access. Therefore, if the MSC is connected to multiple fabrics, the Backup Master also must be connected to those same fabrics. When you select a Backup Master, the HBAnyware Security Configurator displays a warning if it detects that the system selected to be a Backup Master is not able to physically access the same systems that the MSC can access.

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Cannot Modify the Security Configuration

Situation:

You cannot modify the security configuration.

Resolution:

You select a system (or group of systems) from the MSC to be the Backup Master. The system must be either an unsecured system (which will be secured by being made a Backup Master), or a system that is not part of any ASG (client or server). These systems will mirror the MSC's security configuration.

The Backup Master has client access from the HBAnyware utility to all of the servers in the MSC's ACG. However, the Backup Master does not have client access to the MSC and it cannot modify the security configuration (create, modify or delete ASGs).

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No Backup Master and the MSC Is No Longer Available

Situation:

I do not have a Backup Master and the MSC system is no longer available. The servers are still secure. I installed the HBAnyware Security Configurator on another system, but I cannot access those servers to remove the security from them.

Resolution:

The servers are no longer part of a valid security configuration because there is no MSC to provide master control of the configuration. In order to reset the security on the affected servers, you will need to contact Emulex Technical Support to receive a special application and instructions on the reset procedure. After the servers have been reset, they should be seen by the HBAnyware Security Configurator and the HBAnyware utility. At this point, you can set up security again through another MSC. At this time, also create a Backup Master.

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The Backup Master Tab Is Not Available

Situation:

The Backup Master tab is not available.

Resolution:

The Backup Master tab is displayed only when the HBAnyware Security Configurator is running on the MSC or a Backup Master. You use this tab to set up a system or systems to be backups to the MSC and to replace the MSC with a Backup Master.

Each time you start the HBAnyware Security Configurator on the MSC and there is no Backup Master assigned, a warning message urges you to assign at least one Backup Master to prevent the loss of security information if the MSC were to become disabled.

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Error Message Appears When Creating an ASG

Situation:

The following error message appears when I create an ASG:

Resolution:

You entered a duplicate ASG name in the Access Sub-Group Name field. At each level of the security topology, each ASG name must be unique.

Click OK and enter a unique ASG name.

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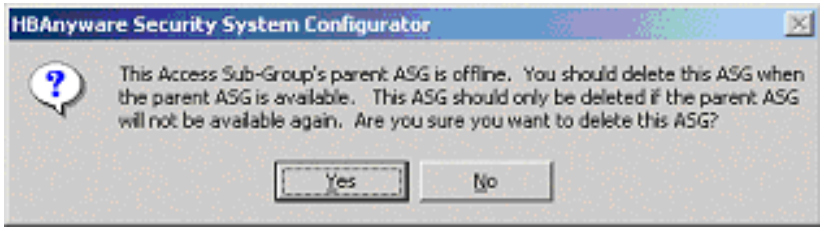
Error Message Appears When Deleting an ASG

Situation:

The following message appears when I delete an ASG:


HBAnyware Security System Configurator
This Access Sub-Group's parent ASG is offline. You should delete this ASG when the parent ASG is available. This ASG should only be deleted if the parent ASG will not be available again. Are you sure you want to delete this ASG?
Yes
No

Resolution:

The offline ASG entry serves as a placeholder for where the real ASG would be in the tree. You can neither modify nor delete it (although it is removed from the display if all of the child ASGs are deleted). It is possible to delete the child ASGs of the offline ASG. However, it is recommended that you delete them only if the client for the offline ASG will never be put online again. It is best to delete child ASGs when the parent ASG is online.

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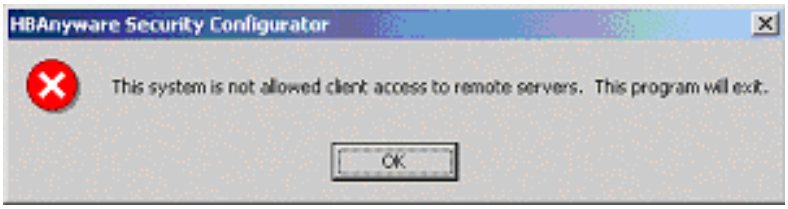
Error Message Appears When Starting the HBAnyware Security Configurator

Situation:

The following message appears when I start the Configurator:



Resolution:

The system you are running the Configurator on is already under the security umbrella as a server to one or more clients.

To make this server a client (so that it can successfully run the Configurator), do the following:

1. Run the Configurator on the MSC or on any client that has this server in its ASG.
2. Make this server a client to a group of servers.

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Error Message States "No Backup Master Client Assigned"

Situation:

The following error message appears when I start the Configurator:

HBAnyware Security Configurator
There are no Backup Master Client Systems assigned to this security configuration. At least one should be assigned to avoid loss of the security configuration should the Master Client System become disabled.
OK

Resolution:

Use the Backup Master tab to assign a Backup Master for the MSC.

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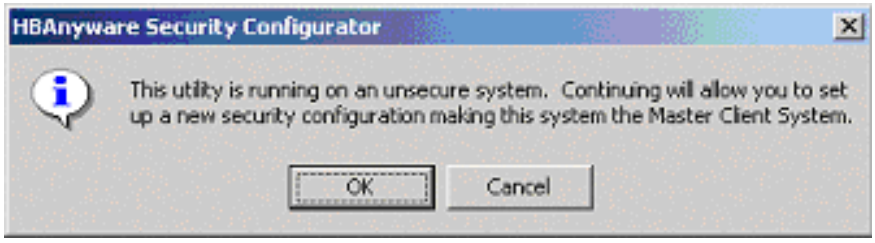
Error Message States "Utility is Running on an Unsecure System"

Situation:

The first time the HBAnyware Security Configurator is started in an unsecure environment, the following message appears:


HBAnyware Security Configurator
This utility is running on an unsecure system. Continuing will allow you to set up a new security configuration making this system the Master Client System.
OK
Cancel

Resolution:

Press OK and complete the ACG setup. The system on which the Configurator is running will become the MSC.

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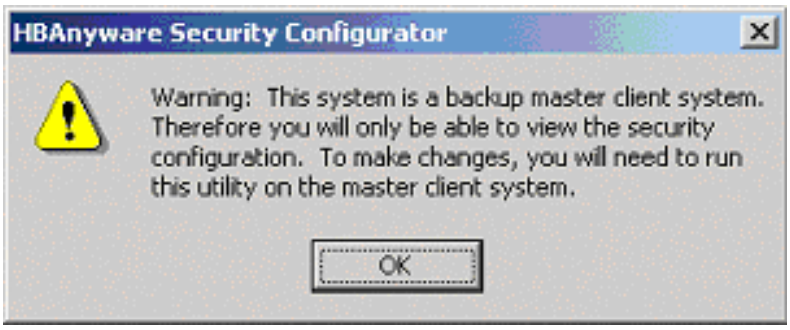
Error Message States "System is a Backup Master Client System"

Situation:

When I start the HBAnyware Security Configurator on a Backup Master system, the following message is displayed:


HBAnyware Security Configurator
Warning: This system is a backup master client system. Therefore you will only be able to view the security configuration. To make changes, you will need to run this utility on the master client system.
OK

Resolution:

Because each Backup Master system receives all the updates that the MSC makes to the security configuration, the Backup Master systems must be online when the HBAnyware Security Configurator is running on the MSC. Otherwise, updates to the security configuration are not reflected to the Backup Master. If the Backup Master becomes the MSC, corruption of the security configuration may occur.

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The MSC Is No Longer Bootable or Able to Connect to the FC Network

Situation:

The MSC is no longer bootable or able to connect to the FC network.

Resolution:

You must reassign a Backup Master as the new MSC from the Backup Master.

> **Warning** Use this procedure only if the MSC cannot relinquish control to a Backup Master. For example, if the MSC is no longer bootable or able to connect to the FC network. Under any other circumstances, if the Backup Master takes over as the MSC and the MSC is still running or comes back online later, there will be two MSCs for the same security configuration. This will eventually lead to corruption of the security configuration.

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New Keys Were Generated While Servers Were Offline

Situation:

A "Generate New Keys" operation was performed while one or more of the servers were offline. Now those servers can no longer access the HBAnyware Security Configurator or the HBAnyware utility.

Resolution:

The servers are no longer part of the security configuration. In order to reset the security on the affected servers, you must contact Emulex Technical Support to receive a special application and instructions on the reset procedure. After the servers have been reset, they can be added back into the security topology by the MSC.

Note	If the server was also a client to an ASG, then when you run the Configurator on the MSC or a parent client of this client, its label in the ASG tree of the Access Sub-Group tab will be "- ASG (Offline Client) -". You must delete the ASG (after deleting the child ASGs) and recreate the ASG configuration of this client and its child ASGs.

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Security Removed While Servers Were Offline

Situation:

Security was removed while one or more servers were offline. I can no longer access those servers from the HBAnyware Security Configurator or the HBAnyware utility.

Resolution:

The servers are no longer part of the security configuration. In order to reset the security on the affected servers, contact Emulex Technical Support to receive a special application and instructions on the reset procedure. After the servers have been reset, they should be seen by the HBAnyware Security Configurator or the HBAnyware utility.

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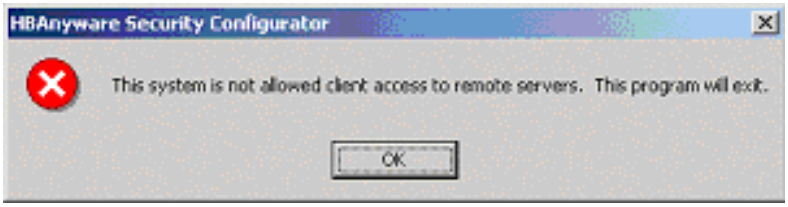
Cannot Run the Configurator on a System that Is Configured for Only Secure Access

Situation:

I cannot run the HBAnyware Security Configurator on a system that is configured for only secure server access (it has no client privileges). The following message is displayed when the HBAnyware Security Configurator starts:



Resolution:

You cannot run the HBAnyware Security Configurator on a system that is configured for only secure server access. Click OK and the Configurator stops.

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Introduction

Log messages are organized into logical groups based on code functionality within the Fibre Channel driver. Each group consists of a block of 100 log message numbers. Most groups require a single block of 100 message numbers, however some groups (INIT, FCP) require two blocks.

The groups and the associated number ranges are defined in the Message Log table below. The preamble string shown in the Message Log table is displayed as part of the log message. The lower case 'x' of the preamble string defines the severity of the log message. The 'x' will be replaced by one of five lower case letters. Those letters are defined in the Severity Code table.

Severity Codes

Information and warning messages can be turned ON or OFF by setting/resetting the appropriate mask bit(s) in the variable 'lpfc_log_verbose' located in the driver configuration module, lpfc.conf.c. By default, both information and warning messages are disabled. Configuration error (c), error (e), and panic (p) messages can not be disabled.

Severity Code Table

Code	Severity
i	Information
w	Warning
c	Configuration error
e	Error
p	Panic

Message Group Masks

The following table defines the log message groups and the associated number ranges.

- The preamble string shown in this table is displayed as part of the log message.
- The lower case 'x' of the preamble string defines the severity of the log message and represents one of five lower case letters defined in the severity codes table.

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Message Log Table

LOG Message Verbose Mask Definition	Preamble String	From	To	Verbose Bit	Verbose Description
LOG_ELS	ELx	0100	0199	0x1	ELS events
LOG_DISCOVERY	DIx	0200	0299	0x2	Link discovery events
LOG_MBOX	MBx	0300	0399	0x4	Mailbox events
LOG_INIT	INx	0400	0499	0x8	Initialization events
Future		0500	0599		
LOG_IP	IPx	0600	0699	0x20	IP traffic history
LOG_FCP	FPx	0700	0799	0x40	FCP traffic history
Future		0800	0899		
LOG_NODE	NDx	0900	0999	0x80	Node table events
Reserved		1000	1099	0x100	
LOG_TGTM	TMx	1100	1199	0x200	FCP Target Node events
LOG_MISC	MIx	1200	1299	0x400	Miscellaneous events
LOG_LINK_EVENT	LKx	1300	1399	0x10	Link events
LOG_SLI	SLx	1400	1499	0x800	SLI events
IOCTL_ERROR	IOx	1600	1699	0x2000	IOCTL events
LOG_ALL_MSG_				0x1fff	Log all messages

The following is an example of a LOG message:

Jul 12 16:30:26 <node> kernel: !lpfc0:0234:DIi:Device Discovery completes

In the above LOG message:

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- lpfc0 identifies the LOG message as coming from EMULEX HBA0.
- 0234 identifies the LOG message number.
- DIi identifies the LOG message as a DISCOVERY (DI) INFORMATION (i) message.

> **Note** If the word 'Data:' is present in a LOG message, any information to the right of 'Data:' is intended for Emulex technical support/engineering use only.

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ELS Events (0100 - 0199)

elx_mes0100: FLOGI failure

DESCRIPTION: An ELS FLOGI command that was sent to the fabric failed.

DATA: (1) ulpStatus (2) ulpWord[4]

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0101: FLOGI completes successfully

DESCRIPTION: An ELS FLOGI command that was sent to the fabric succeeded.

DATA: (1) ulpWord[4] (2) e_d_tov (3) r_a_tov (4) edtovResolution

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0102: PLOGI completes to NPort <nlp_DID>

DESCRIPTION: The HBA performed a PLOGI into a remote NPort.

DATA: (1) ulpStatus (2) ulpWord[4] (3) disc (4) num_disc_nodes

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0103: PRLI completes to NPort <nlp_DID>

DESCRIPTION: The HBA performed a PRLI into a remote NPort.

DATA: ((1) ulpStatus (2) ulpWord[4] (3) num_disc_nodes

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0104: ADISC completes to NPort <nlp_DID>

DESCRIPTION: The HBA performed a ADISC into a remote NPort.

DATA: (1) ulpStatus (2) ulpWord[4] (3) disc (4) num_disc_nodes

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0105: LOGO completes to NPort <nlp_DID>

DESCRIPTION: The HBA performed a LOGO to a remote NPort.

DATA: (1) ulpStatus (2) ulpWord[4] (3) num_disc_nodes

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0106: ELS cmd tag <ulpIoTag> completes

DESCRIPTION: The specific ELS command was completed by the firmware.

DATA: (1) ulpStatus (2) ulpWord[4]

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0107: Retry ELS command <elsCmd> to remote NPORT <did>

DESCRIPTION: The driver is retrying the specific ELS command.

DATA: ((1) retry (2) delay

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0108: No retry ELS command <elsCmd> to remote NPORT <did>

DESCRIPTION: The driver decided not to retry the specific ELS command that failed.

DATA: (1) retry (2) nlp_flag

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0109: ACC to LOGO completes to NPort <nlp_DID>

DESCRIPTION: The driver received a LOGO from a remote NPort and successfully issued an ACC response.

DATA: (1) nlp_flag (2) nlp_state (3) nlp_rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0110: ELS response tag <ulpIoTag> completes

DESCRIPTION: The specific ELS response was completed by the firmware.

DATA: (1) ulpStatus (2) ulpWord[4] (3) nlp_DID (4) nlp_flag (5) nlp_state (6) nle. nlp_rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0111: Dropping received ELS cmd

DESCRIPTION: The driver decided to drop an ELS Response ring entry.

DATA: (1) ulpStatus (2) ulpWord[4]

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver or firmware problem. If problems persist report these errors to Technical Support.

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elx_mes0112: ELS command <elsCmd> received from NPORT <did>

DESCRIPTION: Received the specific ELS command from a remote NPort.

DATA: (1) fc_ffstate

SEVERITY: Information

LOG: LOG_ELS verbose

MODULE: fcelsb.c

ACTION: No action needed, informational.

elx_mes0113: An FLOGI ELS command <elsCmd> was received from DID <did> in Loop Mode

DESCRIPTION: While in Loop Mode an unknown or unsupported ELS command was received.

DATA: None

SEVERITY: Error

LOG: Always

ACTION:Check device DID

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elx_mes0114: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0115: Unknown ELS command <elsCmd> received from NPORT <did>

DESCRIPTION: Received an unsupported ELS command from a remote NPORT.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: Check remote NPORT for potential problem.

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elx_mes0116: Xmit ELS command <elsCmd> to remote NPORT <did>

DESCRIPTION: Xmit ELS command to remote NPORT.

DATA: (1) icmd->ulpIoTag (2) binfo->fc_ffstate

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0117: Xmit ELS response <elsCmd> to remote NPORT <did>

DESCRIPTION: Xmit ELS response to remote NPORT.

DATA: (1) icmd->ulpIoTag (2) size

SEVERITY: Information

LOG: LOG_ELS verbose

MODULE: fcelsb.c

ACTION: No action needed, informational.

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elx_mes0118: Xmit CT response on exchange <xid>

DESCRIPTION: Xmit a CT response on the appropriate exchange.

DATA: (1) ulpIoTag (2) fc_ffstate

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0119: Issue GEN REQ IOCB for NPORT <did>

DESCRIPTION: Issue a GEN REQ IOCB for remote NPORT. These are typically used for CT request.

DATA: (1) ulpIoTag (2) fc_ffstate

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0120: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0121: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0122: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0123: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION:No action needed, informational.

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elx_mes0124:PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA:(1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0125: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

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elx_mes0126: PLOGI chkparm OK

DESCRIPTION: Received a PLOGI from a remote NPORT and its Fibre Channel service parameters match this HBA. Request can be accepted.

DATA: (1) nlp_DID (2) nlp_state (3) nlp_flag (4) nlp_Rpi

SEVERITY: Information

LOG: LOG_ELS verbose

ACTION: No action needed, informational.

elx_mes0127: ELS timeout

DESCRIPTION: An ELS IOCB command was posted to a ring and did not complete within ULP timeout seconds.

DATA: (1) elscmd (2) did (3) ulpcommand (4) iotag

SEVERITY: Error

LOG: Always

ACTION: If no ELS command is going through the adapter, reboot the system; If problem persists, contact Technical Support.

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Link Discovery Events (0200 - 0299)

elx_mes0200: CONFIG_LINK bad hba state <hba_state>

DESCRIPTION: A CONFIG_LINK mbox command completed and the driver was not in the right state.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: Software driver error. If this problem persists, report these errors to Technical Support.

elx_mes0201: Abort outstanding I/O on NPort <nlp_DID>

DESCRIPTION: All outstanding I/Os are cleaned up on the specified remote NPort.

DATA: (1) nlp_flag (2) nlp_state (3) nle.nlp_rpi

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0202: Start Discovery hba state <hba_state>

DESCRIPTION: Device discovery / rediscovery after FLOGI, FAN or RSCN has started.

DATA: (1) tmo (2) fc_plogi_cnt (3) fc_adisc_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0203: Nodev timeout on NPort <nlp_DID>

DESCRIPTION: A remote NPort the was discovered by the driver disappeared for more than ELX_NODEV_TMO seconds.

DATA: (1) nlp_flag (2) nlp_state (3) nlp_rpi

SEVERITY: Error

LOG: Always

ACTION: Check connections to Fabric / HUB or remote device.

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elx_mes0204: Create SCSI Target <tgt>

DESCRIPTION: A mapped FCP target was discovered and the driver has allocated resources for it.

DATA: None

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: No action needed, informational.

elx_mes0205: Create SCSI LUN <lun> on Target <tgt>

DESCRIPTION: A LUN on a mapped FCP target was discovered and the driver has allocated resources for it.

DATA: None

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: No action needed, informational.

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elx_mes0206: Report Lun completes on NPort <nlp_DID>

DESCRIPTION: The driver issued a REPORT_LUN SCSI command to a FCP target and it completed.

DATA: (1) ulpStatus (2) rspStatus2 (3) rspStatus3 (4) nlp_failMask

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: No action needed, informational.

elx_mes0207: Issue Report LUN on NPort <nlp_DID>

DESCRIPTION: The driver issued a REPORT_LUN SCSI command to a FCP target.

DATA: (1) nlp_failMask (2) nlp_state (3) nlp_rpi

SEVERITY:Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

No action needed, informational.

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elx_mes0208: Failmask change on NPort <nlp_DID>

DESCRIPTION: An event was processed that indicates the driver may not be able to communicate with the remote NPort.

DATA: (1) nlp_failMask (2) bitmask (3) flag

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0209: RFT request completes ulpStatus <ulpStatus> CmdRsp <CmdRsp>

DESCRIPTION: A RFT request that was sent to the fabric completed.

DATA: (1) nlp_failMask (2) bitmask (3) flag

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0210: Continue discovery with <num_disc_nodes> ADISCs to go

DESCRIPTION: A device discovery is in progress.

DATA: (1) fc_adisc_cnt (2) fc_flag (3) phba->hba_state

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0211: DSM in event <evt> on NPort <nlp_DID> in state <cur_state>

DESCRIPTION: The driver Discovery State Machine is processing an event.

DATA: (1) nlp_flag

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION:No action needed, informational.

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elx_mes0212: DSM out state <rc> on NPort <nlp_DID>

DESCRIPTION: The driver Discovery State Machine completed processing an event.

DATA: (1) nlp_flag

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

0elx_mes0213: Reassign scsi id <sid> to NPort <nlp_DID>

DESCRIPTION: A previously bound FCP Target has been rediscovered and reassigned a scsi id.

DATA: (1) nlp_bind_type (2) nlp_flag (3) nlp_state (4) nlp_rpi

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: No action needed, informational.

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elx_mes0214: RSCN received

DESCRIPTION: An RSCN ELS command was received from a fabric.

DATA: (1) fc_flag (2) i (3) *lp (4) fc_rscn_id_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0215: RSCN received

DESCRIPTION: An RSCN ELS command was received from a fabric and processed.

DATA: (1) fc_flag (2) cnt (3) fc_rscn_id_cnt (4) fc_ffstate

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION:No action needed, informational.

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elx_mes0216: Assign scandown scsi id <sid> to NPort <nlp_DID>

DESCRIPTION: A scsi id is assigned due to BIND_ALPA.

DATA: ((1) nlp_bind_type (2) nlp_flag (3) nlp_state (4) nlp_rpi

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: No action needed, informational.

elx_mes0217: Unknown Identifier in RSCN payload

DESCRIPTION: Typically the identifier in the RSCN payload specifies a domain, area or a specific NportID. If neither of these are specified, a warning will be recorded.

DATA: (1) didp->un.word

SEVERITY: Error

LOG: Always

ACTION: Potential problem with Fabric. Check with Fabric vendor.

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elx_mes0218: FDMI Request

DESCRIPTION: The driver is sending an FDMI request to the fabric.

DATA: (1) fc_flag (2) hba_state (3) cmdcode

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0219: Issue FDMI request failed

DESCRIPTION: Cannot issue FDMI request to HBA.

DATA: (1) cmdcode

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0220: FDMI rsp failed

DESCRIPTION: An error response was received to FDMI request.

DATA:(1) SWAP_DATA16(fdmi_cmd)

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: The fabric does not support FDMI, check fabric configuration.

elx_mes0221: FAN timeout

DESCRIPTION: A link up event was received without the login bit set, so the driver waits E_D_TOV for the Fabric to send a FAN. If no FAN if received, a FLOGI will be sent after the timeout.

DATA: None

SEVERITY: Warning

LOG: LOG_DISCOVERY verbose

ACTION: None required. The driver recovers from this condition by issuing a FLOGI to the fabric.

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elx_mes0222: Initial FLOGI timeout

DESCRIPTION:The driver sent the initial FLOGI to fabric and never got a response back.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.

elx_mes0223: Timeout while waiting for NameServer login

DESCRIPTION: Our login request to the NameServer was not acknowledged within RATOV.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: Check the fabric configuration. The driver recovers from this and continues with device discovery.

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elx_mes0224: NameServer Query timeout

DESCRIPTION: Node authentication timeout, node Discovery timeout. A NameServer Query to the Fabric or discovery of reported remote NPorts is not acknowledged within R_A_TOV.

DATA: (1) fc_ns_retry (2) fc_max_ns_retry

SEVERITY: Error

LOG: Always

ACTION: Check Fabric configuration. The driver recovers from this and continues with device discovery.

elx_mes0225: Device Discovery completes

DESCRIPTION: This indicates successful completion of device (re)discovery after a link up.

DATA: None

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0226: Device discovery completion error

DESCRIPTION: This indicates that an uncorrectable error was encountered during device (re)discovery after a link up. Fibre Channel devices will not be accessible if this message is displayed.

DATA: None

SEVERITY: Error

LOG: Always

MODULE: fcscsib.c

ACTION: Reboot the system. If the problem persists, report the error to Technical Support. Run with verbose mode on for more details.

elx_mes0227: Node Authentication timeout

DESCRIPTION: The driver has lost track of what NPORTs are being authenticated.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: None required. The driver should recover from this event.

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elx_mes0228: CLEAR LA timeout

DESCRIPTION: The driver issued a CLEAR_LA that never completed.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: None required. The driver should recover from this event.

elx_mes0229: Assign scsi ID <sid> to NPort <nlp_DID>

DESCRIPTION: The driver assigned a scsi id to a discovered mapped FCP target.

DATA: (1) nlp_bind_type (2) nlp_flag (3) nlp_state (4) nlp_rpi

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: No action needed, informational.

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elx_mes0230: Cannot assign scsi ID on NPort <nlp_DID>

DESCRIPTION: The driver cannot assign a scsi id to a discovered mapped FCP target.

DATA: (1) nlp_flag (2) nlp_state (3) nlp_rpi

SEVERITY: Information

LOG: LOG_DISCOVERY | LOG_FCP verbose

ACTION: Check persistent binding information.

elx_mes0231: RSCN timeout

DESCRIPTION: The driver has lost track of what NPORTs have RSCNs pending.

DATA: (1) fc_ns_retry (2) fc_max_ns_retry

SEVERITY: Error

LOG: Always

ACTION: None required. The driver should recover from this event.

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elx_mes0232: Continue discovery with <num_disc_nodes> PLOGIs to go

DESCRIPTION: Device discovery is in progress.

DATA: (1) fc_plogi_cnt (2) fc_flag (3) phba->hba_state

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0234: ReDiscovery RSCN

DESCRIPTION: The number / type of RSCNs has forced the driver to go to the nameserver and re-discover all NPORTs.

DATA: (1) fc_defer_rscn.q_cnt (2) fc_flag (3) hba_state

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0235: Deferred RSCN

DESCRIPTION: The driver has received multiple RSCNs and has deferred the processing of the most recent RSCN.

DATA: (1) fc_defer_rscn.q_cnt (2) fc_flag (3) hba_state

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0236: NameServer req

DESCRIPTION: The driver is issuing a NameServer request to the fabric.

DATA: (1) cmdcode (2) fc_flag (3) fc_rscn_id_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0237: Pending Link Event during Discovery

DESCRIPTION: Received link event during discovery. Causes discovery restart.

DATA: (1) hba_state (2) ulpIoTag (3) ulpStatus (4) ulpWord[4]

SEVERITY: Warning

LOG: LOG_DISCOVERY verbose

ACTION: None required unless problem persist. If persistent check cabling.

elx_mes0238: NameServer Rsp

DESCRIPTION: The driver received a NameServer response.

DATA: (1) Did (2) nlp_flag (3) fc_flag (4) fc_rscn_id_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0239: NameServer Rsp

DESCRIPTION: The driver received a NameServer response.

DATA: (1) Did (2) ndlp (3) fc_flag (4) fc_rscn_id_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

elx_mes0240: NameServer Rsp Error

DESCRIPTION: The driver received a NameServer response containing a status error.

DATA: (1) CommandResponse.bits.CmdRsp (2) ReasonCode
(3) Explanation (4) fc_flag

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: Check the fabric configuration. The driver recovers from this and continues with device discovery.

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elx_mes0241: NameServer rsp error

DESCRIPTION: The driver received a NameServer response containing a status error.

DATA: (1) CommandResponse.bits.CmdRsp (2) ReasonCode
(3) Explanation (4) fc_flag

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: Check the fabric configuration. The driver recovers from this and continues with device discovery.

elx_mes0243: Issue FDMI request failed

DESCRIPTION: Cannot issue an FDMI request to HBA.

DATA: (1) cmdcode

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0244: Issue FDMI request failed

DESCRIPTION: Cannot issue an FDMI request to the HBA.

DATA: (1) cmdcode

SEVERITY: Information

LOG: LOG_Discovery verbose

ACTION: No action needed, informational.

elx_mes0245: ALPA based bind method used on an HBA which is in a nonloop topology

DESCRIPTION: ALPA based bind method used on an HBA which is not in a loop topology.

DATA: (1) topology

SEVERITY: Warning

LOG: LOG_DISCOVERY verbose

ACTION: Change the bind method configuration parameter of the HBA to 1 (WWNN) or 2(WWPN) or 3(DID)

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elx_mes0246: RegLogin failed

DESCRIPTION: The firmware returned a failure for the specified RegLogin.

DATA: Did, mbxStatus, hbaState

SEVERITY: Error

LOG: Always

MODULE: fcscsib.c

ACTION: This message indicates that the firmware could not do RegLogin for the specified Did. There may be a limitation on how many nodes an HBA can see.

elx_mes0247: Start Discovery Timer state <hba_state>

DESCRIPTION: Start the device discovery / RSCN rescue timer.

DATA: (1) tmo (2) disctmo (3) fc_plogi_cnt (4) fc_adisc_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION: No action needed, informational.

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elx_mes0248: Cancel Discovery Timer state <hba_state>

DESCRIPTION: Cancel the device discovery / RSCN rescue timer.

DATA: (1) fc_flag (2) rc (3) fc_plogi_cnt (4) fc_adisc_cnt

SEVERITY: Information

LOG: LOG_DISCOVERY verbose

ACTION:No action needed, informational.

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Mailbox Events (0300 - 0399)

elx_mes0300: READ_LA: no buffers

DESCRIPTION: The driver attempted to issue a READ_LA mailbox command to the HBA, but there were no buffers available.

DATA: None

SEVERITY: Warning

LOG: LOG_MBOX verbose

ACTION: This message indicates: (1) a possible lack of memory resources. Try increasing the lpfc 'num_bufs' configuration parameter to allocate more buffers. (2) A possble driver buffer management problem. If this problem persists, report the error to Technical Support.

elx_mes0301: READ_SPARAM: no buffers

DESCRIPTION: The driver attempted to issue a READ_SPARAM mailbox command to the HBA, but there were no buffers available.

DATA: None

SEVERITY: Warning

LOG: LOG_MBOX verbose

ACTION: This message indicates: (1) a possible lack of memory resources. Try increasing the lpfc 'num_bufs' configuration parameter to allocate more buffers. (2) A possble driver buffer management problem. If the problem persists, report the error to Technical Support.

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elx_mes0302: REG_LOGIN: no buffers

DESCRIPTION: The driver attempted to issue a REG_LOGIN mailbox command to the HBA, but there were no buffers available.

DATA: None

SEVERITY: Warning

LOG: LOG_MBOX verbose

ACTION: This message indicates: (1) a possible lack of memory resources. Try increasing the lpfc 'num_bufs' configuration parameter to allocate more buffers. (2) A possble driver buffer management problem. If the problem persists, report the error to Technical Support.

elx_mes0304: Stray mailbox interrupt, mbxCommand <cmd> mbxStatus <status>

DESCRIPTION: Received a mailbox completion interrupt and there are no outstanding mailbox commands.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0305: Mbox cmd cmpl error - RETRYing

DESCRIPTION: A mailbox command completed with an error status that causes the driver to reissue the mailbox command.

DATA: (1) mbxCommand (2) mbxStatus (3) word1 (4) hba_state

SEVERITY: Information

LOG: LOG_MBOX verbose

ACTION: No action needed, informational.

elx_mes0306: CONFIG_LINK mbxStatus error <mbxStatus> HBA state <hba_state>

DESCRIPTION: The driver issued a CONFIG_LINK mbox command to the HBA that failed.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a firmware or hardware problem. Report these errors to Technical Support.

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elx_mes0307: Mailbox Cmpl, wd0 <pmbox> wd1 <varWord> wd2 <varWord> cmpl <mbox_cmpl)

DESCRIPTION: A mailbox command completed.

DATA: None

SEVERITY: Information

LOG: LOG_MBOX verbose

ACTION: No action needed, informational.

elx_mes0308: Mbox cmd issue - BUSY

DESCRIPTION: The driver attempted to issue a mailbox command while the mailbox was busy processing the previous command. The processing of the new command will be deferred until the mailbox becomes available.

DATA: (1) mbxCommand (2) hba_state (3) sli_flag (4) flag

SEVERITY: Information

LOG: LOG_MBOX verbose

ACTION: No action needed, informational.

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elx_mes0309: Mailbox cmd <cmd> issue

DESCRIPTION: The driver is in the process of issuing a mailbox command.

DATA: (1) hba_state (2) sli_flag (3) flag

SEVERITY: Information

LOG: LOG_MBOX verbose

ACTION: No action needed, informational.

elx_mes0310: Mailbox command <cmd> timeout

DESCRIPTION: A mailbox command was posted to the adapter and did not complete within 30 seconds.

DATA: (1) hba_state (2) sli_flag (3) mbox_active

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver or firmware problem. If no I/O is going through the adapter, reboot the system. If the problem persists, report the error to Technical Support.

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elx_mes0311: Mailbox command <cmd> cannot issue

DESCRIPTION: The driver is in the wrong state to issue the specified command.

DATA: (1) hba_state (2) sli_flag (3) flag

SEVERITY: Information

LOG: LOG_MBOX verbose

MODULE: fcscsib.c

ACTION: No action needed, informational.

elx_mes0312: Ring <ringno> handler: portRspPut <portRspPut> is bigger then rsp ring <portRspMax>

DESCRIPTION: The port rsp ring put index is larger than the size of the rsp ring.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

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elx_mes0313: Ring <ringno> handler: unexpected Rctl <Rctl> Type <Type> received

DESCRIPTION:The Rctl/Type of a received frame did not match any for the configured masks for the specified ring.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

elx_mes0314: Ring <ringno> issue: portCmdGet <portCmdGet> is bigger then cmd ring <portCmdMax>

DESCRIPTION: The port cmd ring get index is greater than the size of cmd ring.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

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elx_mes0315: Ring <ringno> issue: portCmdGet <portCmdGet> is bigger then cmd ring <portCmdMax>

DESCRIPTION: The port cmd ring get index is greater than the size of cmd ring.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

elx_mes0316: Cmd ring <ringno> put: iotag <iotag> greater then configured max <fast_iotag> wd0 <icmd>

DESCRIPTION: The assigned I/O iotag is greater than the allowed maximum.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

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elx_mes0317: Rsp ring <ringno> get: iotag <iotag> greater then configured max <fast_iotag> wd0 <irsp>

DESCRIPTION: The assigned I/O iotag is greater than the maximum allowed.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

elx_mes0318: Outstanding I/O count for ring <ringno> is at max <fast_iotag>

DESCRIPTION: An I/O tag cannot be assigned because none are available. The maximum number of allowed I/Os are currently outstanding.

DATA: None

SEVERITY: Information

LOG:LOG_SLI verbose

ACTION: This message indicates the adapter HBA I/O queue is full. Typically this happens when heavy I/O is running on a low-end (3 digit) adapter. We suggest you upgrade to a higher-end adapter.

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elx_mes0319: The driver issued a READ_SPARAM mbox command to the HBA that failed.

DESCRIPTION: The driver issued a READ_SPARAM mbox command to the HBA that failed.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a firmware or hardware problem. Report these errors to Technical Support.

elx_mes0320: CLEAR_LA mbxStatus error <mbxStatus> hba state <hba_state>

DESCRIPTION: The driver issued a CLEAR_LA mbox command to the HBA that failed.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a firmware or hardware problem. Report these errors to Technical Support.

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elx_mes0321: Unknown IOCB command

DESCRIPTION: Received an unknown IOCB command completion.

DATA: (1) ulpCommand (2) ulpStatus (3) ulpIoTag (4) ulpContext)

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver or firmware problem. If these problems persist, report these errors to Technical Support.

elx_mes0322: Ring <ringno> handler: unexpected completion IoTag <IoTag>

DESCRIPTION:The driver could not find a matching command for the completion received on the specified ring.

DATA: (1) ulpStatus (2) ulpWord[4] (3) ulpCommand (4) ulpContext

SEVERITY: Warning

LOG: LOG_SLI verbose

ACTION:This error could indicate a software driver or firmware problem. If problems persist report these errors to Technical Support.

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elx_mes0323: Unknown Mailbox command <cmd> Cmpl

DESCRIPTION: A unknown mailbox command completed.

DATA: (1) Mailbox Command

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

elx_mes0324: Adapter initialization error, mbxCmd <cmd> READ_NVPARM, mbxStatus <status>

DESCRIPTION: A read nvparams mailbox command failed during port configuration.

DATA:(1) Mailbox Command (2) Mailbox Command Status

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver, firmware or hardware problem. Report these errors to Technical Support.

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Initialization Events (0400 - 0499)

elx_mes400: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes401: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

elx_mes402: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes403: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

elx_mes404: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes0405: Service Level Interface (SLI) 2 selected

DESCRIPTION: A CONFIG_PORT (SLI2) mailbox command was issued.

DATA: None

SEVERITY: Information

LOG: LOG_INIT verbose

ACTION: No action needed, informational.

elx_mes0406: Memory buffer pool is below low water mark

DESCRIPTION: A driver memory buffer pool is low on buffers.

DATA: (1) seg (2) fc_lowmem (3) low

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required. The driver will recover as buffers are returned to the pool.

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elx_mes0407: Memory Buffer Pool is at upper limit.

DESCRIPTION: A memory buffer pool cannot add more buffers because it is at its himem value.

DATA: (1) seg (2) q_cnt (3) himem

SEVERITY: Error

LOG: Always

ACTION: None required. The driver will recover as buffers are returned to the pool.

elx_mes0408: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0409: Memory Buffer Pool is out of buffers

DESCRIPTION: A driver memory buffer pool is exhausted.

DATA: (1) seg (2) fc_free (3) fc_mbox.q_cnt (4) fc_memhi

SEVERITY: Error

LOG: Always

ACTION: Configure more resources for that buffer pool. If the problem persists, report the error to Technical Support.

elx_mes0410: Cannot find virtual addr for mapped buf on ring <num>

DESCRIPTION: The driver cannot find the specified buffer in its mapping table. Thus it cannot find the virtual address needed to access the data.

DATA: (1) first (2) q_first (3) q_last (4) q_cnt

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver or firmware problem. If problems persist report these errors to Technical Support.

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elx_mes0411: fcp_bind_method is 4 with Persistent binding - ignoring fcp_bind_method

DESCRIPTION: The configuration parameter for fcp_bind_method conflicts with Persistent binding parameter.

DATA: (1) a_current (2) fcp_mapping

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file.

elx_mes0412: Scan-down is out of range - ignoring scan-down

DESCRIPTION: The configuration parameter for scan-down is out of range.

DATA: (1) clp[CFG_SCAN_DOWN].a_current (2) fcp_mapping

SEVERITY: Error

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file.

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elx_mes0413: Configuration parameter out of range, resetting to default value

DESCRIPTION: User is attempting to set a configuration parameter to a value not supported by the driver. Resetting the configuration parameter to the default value.

DATA: (1) a_string (2) a_low (3) a_hi (4) a_default

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file.

elx_mes0414: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0415: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: always

ACTION: N/A

elx_mes0416: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0417: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

elx_mes0418: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0419: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0420: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0421: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0422: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0423: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

elx_mes0424: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0425: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0426: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0427: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0428: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0429: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes0430: WWPN binding entry <num>: syntax error code <code>

DESCRIPTION: A syntax error occured while parsing WWPN binding configuraion information.

DATA: None

Detail: Binding syntax error codes

0 FC_SYNTAX_OK
1 FC_SYNTAX_OK_BUT_NOT_THIS_BRD
2 FC_SYNTAX_ERR_ASC_CONVERT
3 FC_SYNTAX_ERR_EXP_COLON
4 FC_SYNTAX_ERR_EXP_LPFC
5 FC_SYNTAX_ERR_INV_LPFC_NUM
6 FC_SYNTAX_ERR_EXP_T
7 FC_SYNTAX_ERR_INV_TARGET_NUM
8 FC_SYNTAX_ERR_EXP_D
9 FC_SYNTAX_ERR_INV_DEVICE_NUM
10 FC_SYNTAX_ERR_INV_RRATIO_NUM
11 FC_SYNTAX_ERR_EXP_NULL_TERM

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file.

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elx_mes0431: WWNN binding entry <num>: syntax error code <code>

DESCRIPTION: A syntax error occured while parsing WWNN binding configuration information.

DATA: None

Detail: Binding syntax error codes

0 FC_SYNTAX_OK
1 FC_SYNTAX_OK_BUT_NOT_THIS_BRD
2 FC_SYNTAX_ERR_ASC_CONVERT
3 FC_SYNTAX_ERR_EXP_COLON
4 FC_SYNTAX_ERR_EXP_LPFC
5 FC_SYNTAX_ERR_INV_LPFC_NUM
6 FC_SYNTAX_ERR_EXP_T
7 FC_SYNTAX_ERR_INV_TARGET_NUM
8 FC_SYNTAX_ERR_EXP_D
9 FC_SYNTAX_ERR_INV_DEVICE_NUM
10 FC_SYNTAX_ERR_INV_RRATIO_NUM
11 FC_SYNTAX_ERR_EXP_NULL_TERM

SEVERITY: Error config

LOG: always

ACTION: Make neccessary changes to the lpfc configuration file.

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elx_mes0432: WWPN binding entry: node table full

DESCRIPTION: More bindings entries were configured than the driver can handle.

DATA: None

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file so that fewer bindings are configured.

elx_mes0433: WWNN binding entry: node table full

DESCRIPTION: More bindings entries were configured than the driver can handle.

DATA: None

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file so that fewer bindings are configured.

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elx_mes0434: DID binding entry <num>: syntax error code <code>

DESCRIPTION: A syntax error occured while parsing DID binding configuration information.

DATA: None

Detail: Binding syntax error codes
0 FC_SYNTAX_OK
1 FC_SYNTAX_OK_BUT_NOT_THIS_BRD
2 FC_SYNTAX_ERR_ASC_CONVERT
3 FC_SYNTAX_ERR_EXP_COLON
4 FC_SYNTAX_ERR_EXP_LPFC
5 FC_SYNTAX_ERR_INV_LPFC_NUM
6 FC_SYNTAX_ERR_EXP_T
7 FC_SYNTAX_ERR_INV_TARGET_NUM
8 FC_SYNTAX_ERR_EXP_D
9 FC_SYNTAX_ERR_INV_DEVICE_NUM
10 FC_SYNTAX_ERR_INV_RRATIO_NUM
11 FC_SYNTAX_ERR_EXP_NULL_TERM

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file.

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elx_mes0435: DID binding entry: node table full

DESCRIPTION: More bindings entries were configured than the driver can handle.

DATA: None

SEVERITY: Error config

LOG: Always

ACTION: Make neccessary changes to the lpfc configuration file so that fewer bindings are configured.

elx_mes0436: Adapter failed to init, timeout, status reg <status>

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset .

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0437: Adapter failed to init, chipset, status reg <status>

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

elx_mes0438: Adapter failed to init, chipset, status reg <status>

DESCRIPTION: The adapter failed during powerup diagnostics after it was reset.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0439: Adapter failed to init, mbxCmd <cmd> READ_REV, mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing a READ_REV mailbox command.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

elx_mes0440: Adapter failed to init, mbxCmd <cmd> READ_REV, detected outdated firmware

DESCRIPTION: Outdated firmware was detected during initialization.

DATA: (1) read_rev_reset

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. Update the firmware. If the problem persists, report the error to Technical Support.

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elx_mes0441: VPD not present on adapter, mbxCmd <cmd> DUMP VPD, mbxStatus <status>

DESCRIPTION: The DUMP_VPD mailbox command failed.

DATA: None

SEVERITY: Information

LOG: LOG_INIT verbose

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

elx_mes0442: Adapter failed to init, mbxCmd <cmd> CONFIG_PORT, mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing a CONFIG_PORT mailbox command.

DATA: (1) hbainit

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0443: N/A

DESCRIPTION: N/A

DATA: (1) N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0444: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0445: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: error

LOG: N/A

ACTION: N/A

elx_mes0446: Adapter failed to init, mbxCmd <cmd> CFG_RING, mbxStatus <status>, ring <num>

DESCRIPTION: Adapter initialization failed when issuing a CFG_RING mailbox command.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0447: Adapter failed init, mbxCmd <cmd> CONFIG_LINK mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing a CONFIG_LINK mailbox command.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

elx_mes0448: Adapter failed to init, mbxCmd <cmd> READ_SPARM, mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing a READ_SPARM mailbox command.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0449: WorldWide PortName type <type> doesn't conform to IP Profile

DESCRIPTION: In order to run IP, the WorldWide PortName must be of type IEEE (NAA = 1). This message is displayed if the adapter WWPN doesn't conform with the standard.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: Turn off the network-on configuration parameter or configure a different WWPN.

elx_mes0450: Adapter failed to init, mbxCmd <cmd> FARP, mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing a FARP mailbox command.

DATA: None

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

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elx_mes0451: Enable interrupt handler failed

DESCRIPTION: The driver attempted to register the HBA interrupt service routine with the host operating system, but failed.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or driver problem. If the problem persists, report the error to Technical Support.

elx_mes0451: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0453: Adapter failed to init, mbxCmd <cmd> READ_CONFIG, mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing a READ_CONFIG mailbox command.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

elx_mes0454: Adapter failed to init, mbxCmd <cmd> INIT_LINK, mbxStatus <status>

DESCRIPTION: Adapter initialization failed when issuing an INIT_LINK mailbox command.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

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elx_mes0455: Vital Product

DESCRIPTION: Vital product data (VPD) contained in the HBA flash.

DATA: (1) vpd[0] (2) vpd[1] (3) vpd[2] (4) vpd[3]

SEVERITY: Information

LOG: LOG_INIT verbose

ACTION: No action needed, informational.

elx_mes0456: N/A

DESCRIPTION: N/A

Data: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0457: Adapter Hardware Error

DESCRIPTION: The driver received an interrupt indicting a possible hardware problem.

Data: (1) status (2) status1 (3) status2

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a hardware or firmware problem. If the problem persists, report the error to Technical Support.

elx_mes0458: Bring adapter online

DESCRIPTION: The FC driver has received a request to bring the adapter online. This may occur when running lputil.

DATA: None

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

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elx_mes0459: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0460: Bring adapter offline

DESCRIPTION: The FC driver has received a request to bring the adapter offline. This may occur when running lputil.

DATA: None

SEVERITY: Warning

LOG: LOG_INIT verbose

ACTION: None required.

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elx_mes0461: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0462: Too many cmd / rsp ring entries in SLI2 SLIM

DESCRIPTION: The configuration parameter for Scan-down is out of range.

DATA: (1) totiocb (2) MAX_SLI2_IOCB

SEVERITY: Error

LOG: Always

ACTION: This is a software driver error. If this problem persists, report these errors to Technical Support.

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Log Messages - IP Traffic History (0600 - 0699)

elx_mes0600: FARP-RSP received from DID <did>

DESCRIPTION: A FARP ELS command response was received.

DATA: None

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: None required.

elx_mes0601: FARP-REQ received from DID <did>

DESCRIPTION: A FARP ELS command response was received.

DATA: None

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: None required.

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elx_mes0602: IP Response ring <num> out of posted buffers

DESCRIPTION: The IP ring returned all posted buffers to the driver and is waiting for the driver to post new buffers. This could mean that the host system is out of TCP/IP buffers.

DATA: (1) fc_missbufcnt (2) NoRcvBuf

SEVERITY: Error

LOG: Always

ACTION: Try allocating more IP buffers (STREAMS buffers or mbufs) of size 4096 and/or increasing the post-ip-buf lpfc configuration parameter. Reboot the system.

elx_mes0603: Xmit Sequence completion error

DESCRIPTION: A XMIT_SEQUENCE command completed with a status error in the IOCB.

DATA: (1) ulpStatus (2) ulpIoTag (3) ulpWord[4] (4) did

SEVERITY: Warning

LOG: LOG_IP verbose

ACTION: If there are many errors to one device, check the physical connections to Fibre Channel network and the state of the remote PortID. The driver attempts to recover by creating a new exchange to the remote device.

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elx_mes0604: Post buffer for IP ring <num> failed

DESCRIPTION: The driver cannot allocate a buffer to post to the IP ring. This usually means that the host system is out of TCP/IP buffers.

DATA: (1) missbufcnt

SEVERITY: Error

LOG: Always

ACTION: Try allocating more IP buffers (STREAMS buffers or mbufs) of size 4096. Reboot the system.

elx_mes0605: No room on IP xmit queue

DESCRIPTION: The system is generating IOCB commands to be processed faster than the adapter can process them.

DATA: (1) xmitnoroom

SEVERITY: Warning

LOG: LOG_IP verbose

ACTION: Check the state of the link. If the link is up and running, reconfigure the transmit queue size to be larger. Note, a larger queue size may require more system IP buffers. If the link is down, check the physical connections to the Fibre Channel network.

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elx_mes0606: XRI Create for IP traffic to DID <did>

DESCRIPTION: The lpfc driver is missing an exchange resource identifier (XRI) for this node and must create one prior to the transmit operation.

DATA: None

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: No action needed, informational.

elx_mes0607: XRI response from DID with XRI <xri> and status <ulpStatus>

DESCRIPTION: The driver received an XRI response from the SLI with the resulting exchange resource id and status.

DATA: None

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: No action needed, informational

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elx_mes0608: IP packet timed out

DESCRIPTION: An IP IOCB command was posted to a ring and did not complete within the timeout seconds.

DATA: (1) Did

SEVERITY: Warning

LOG: LOG_IP verbose

ACTION: If no IP packet is going through the adapter, reboot the system. If the problem persists, contact Technical Support.

elx_mes0609: Network buffer and DMA address mismatch

DESCRIPTION: An IP buffer free operation found a mismatch between an IP buffer and its dma address.

DATA: (1) pib (2) ip buff found (3) ip buf actual (4) dma address

SEVERITY: Error

LOG: Always

ACTION: Stop traffic and reboot the system. If the problem persists, contact Technical Support.

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elx_mes0610: FARP Request sent to remote DID

DESCRIPTION: A send to a remote IP address has no node in the driver's nodelists. Send a FARP request to obtain the node's HW address.

DATA: (1) IEEE[0] (2) IEEE[1] (3) IEEE[2] (4) IEEE[3] (5) IEEE[4] (6) IEEE[5]

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: Issue FARP and wait for PLOGI from remote node. If the problem persists, contact Technical Support.

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FCP Traffic History (0700 - 0799)

elx_mes0700: Start nodev timer

DESCRIPTION: A target disappeared from the Fibre Channel network. If the target does not return within nodev-tmo timeout, all I/O to the target will fail.

DATA: (1) nlp (2) nlp_flag (3) nlp_state (4) nlp_DID

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

elx_mes0701: Issue Abort Task Set to TGT <num> LUN <num>

DESCRIPTION: TThe SCSI layer detected that it needs to abort all I/O to a specific device. This causes the FCP Task Management command to abort the I/O in progress.

DATA: (1) rpi (2) flags

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: Check the state of the device in question.

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elx_mes0702: Issue Target Reset to TGT <num>

DESCRIPTION: The SCSI layer detected that it needs to abort all I/O to a specific target. This results in an FCP Task Management command to abort the I/O in progress.

DATA: (1) rpi (2) flags

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

elx_mes0703: Issue LUN Reset to TGT <num> LUN <num>

DESCRIPTION: The SCSI layer detected that it must abort all I/O to a specific device. This results in an FCP Task Management command to abort the I/O in progress.

DATA: (1) rpi (2) flags

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: Check the state of the device in question.

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elx_mes0706: Start nodev timer

DESCRIPTION: A target disappeared from the Fibre Channel network. If the target does not return within nodev-tmo timeout all I/O to the target will fail.

DATA: (1) nlp_DID (2) nlp_flag (3) nlp_state (4) nlp

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: No action needed, informational.

elx_mes0710: Iodone <target>/<lun> error <result> SNS <lp> <lp3>

DESCRIPTION: This error indicates that the Fibre Channel driver is returning a SCSI command to the SCSI layer in error or with sense data.

DATA: (1) retry (2) resid

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

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elx_mes0712: SCSI layer issued abort device

DESCRIPTION: The SCSI layer is requesting the driver to abort I/O to a specific device.

DATA: (1) target (2) lun (3)

SEVERITY: Error

LOG: Always

ACTION: Check the state of the device in question.

elx_mes0713: SCSI layer issued target reset

DESCRIPTION: The SCSI layer is requesting the driver to abort I/O to a specific target.

DATA: (1) target (2) lun

SEVERITY: Error

LOG: Always

ACTION: Check the state of the target in question.

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elx_mes0714: SCSI layer issued bus reset

DESCRIPTION: The SCSI layer is requesting the driver to abort all I/Os to all targets on this HBA.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: Check the state of the targets in question.

elx_mes0716: FCP residual underrun, expected <len>, residual <resid>

DESCRIPTION: An FCP device provided less data than was requested.

DATA: (1) fcpi_parm (2) cmnd[0] (3) underflow

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

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elx_mes0717: FCP command <cmd> residual underrun converted to error

DESCRIPTION: The driver converted this underrun condition to an error based on the underflow field in the SCSI command.

DATA: (1) len (2) resid (3) underflow

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

elx_mes0721: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0723: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0724: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0725: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0726: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes0727: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0728: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0729: FCP cmd <cmnd> failed <target>/<lun>

DESCRIPTION: The specifed device failed an FCP command.

DATA: (1) status (2) result (3) xri (4) iotag

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

elx_mes0730: FCP command failed: RSP

DESCRIPTION: The FCP command failed with a response error.

DATA: (1) Status2 (2) Status3 (3) ResId (4) SnsLen (5) RspLen (6) Info3

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

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elx_mes0731: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0732: Retry FCP command due to 29,00 check condition

DESCRIPTION: The issued FCP command got a 29,00 check condition and will be retried by the driver.

DATA: (1) *lp (2) *lp+1 (3) *lp+2 (4) *lp+3

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

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elx_mes0733: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0734: FCP read check error

DESCRIPTION: The issued FCP command returned a read check error.

DATA: (1) fcpDl (2) rspResId (3) fcpi_parm (4) cdb[0]

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

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elx_mes0735: FCP read check error with check condition

DESCRIPTION: The issued FCP command returned a read check error and a check condition.

DATA: (1) fcpDl (2) rspResId (3) fcpi_parm (4) cdb[0]

SEVERITY: Warning

LOG: LOG_FCP verbose

ACTION: Check the state of the target in question.

elx_mes0736: Received Queue Full status from FCP device <tgt> <lun>

DESCRIPTION: Received a Queue Full error status from specified FCP device.

DATA: (1) qfull_retry_count (2) qfull_retries (3) currentOutstanding (4) maxOutstanding

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

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elx_mes0737: <ASC ASCQ> Check condition received

DESCRIPTION: The issued FCP command resulted in a check condition.

DATA: (1) CFG_CHK_COND_ERR (2) CFG_DELAY_RSP_ERR (3) *lp

SEVERITY: Information

LOG: LOG_FCP | LOG_CHK_COND verbose

ACTION: None required.

elx_mes0738: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0739: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0740: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0741: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0742: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0743: N/A

DESCRIPTION:N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0744: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0745: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0746: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0747: Cmpl target reset

DESCRIPTION: A driver-initiated target reset completed.

DATA: (1) scsi_id (2) lun_id (3) statLocalError (4) *cmd + WD7

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

elx_mes0748: Cmpl LUN reset

DESCRIPTION: A driver-initiated LUN reset completed.

DATA: (1) scsi_id (2) lun_id (3) statLocalError (4) *cmd + WD7

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

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elx_mes0749: Cmpl abort task set

DESCRIPTION: A driver-initiated abort task set completed.

DATA: (1) scsi_id (2) lun_id (3) statLocalError (4) *cmd + WD7

SEVERITY: Information

LOG: LOG_FCP verbose

ACTION: None required.

elx_mes0750: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0751: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0752: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0753: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0754: SCSI timeout

DESCRIPTION: An FCP IOCB command was posted to a ring and did not complete within ULP timeout seconds.

DATA:(1) did (2) sid (3) command (4) iotag

SEVERITY: Error

LOG: Always

ACTION: If I/O is not going through the adapter, reboot the system; otherwise check the state of the target in question.

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Node Table Events (0900 - 0999)

elx_mes0900: Cleanup node for NPort <nlp_DID>

DESCRIPTION: The driver node table entry for a remote NPort was removed.

DATA: (1) nlp_flag (2) nlp_state (3) nlp_rpi

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0901: FIND node DID mapped

DESCRIPTION:The driver is searching for a node table entry, on the mapped node list, based on the DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0902: FIND node DID mapped

DESCRIPTION: The driver is searching for a node table entry, on the mapped node list, based on DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0903: Add scsiid <sid> to BIND list

DESCRIPTION: The driver is putting the node table entry on the binding list.

DATA: 1) bind_cnt (2) nlp_DID (3) bind_type (4) blp

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0904: Add NPort <did> to PLOGI list

DESCRIPTION: The driver is putting the node table entry on the plogi list.

DATA: (1) plogi_cnt (2) blp

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0905: Add NPort <did> to ADISC list

DESCRIPTION: The driver is putting the node table entry on the adisc list.

DATA: (1) adisc_cnt (2) blp

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0906: Add NPort <did> to UNMAP list

DESCRIPTION: The driver is putting the node table entry on the unmap list.

DATA: (1) unmap_cnt (2) blp

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0907: Add NPort <did> to MAP list scsiid <sid>

DESCRIPTION: The driver is putting the node table entry on the mapped list.

DATA: (1) map_cnt (2) blp

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0908: FIND node DID bind

DESCRIPTION: The driver is searching for a node table entry, on the binding list, based on DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0909: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0910: FIND node DID unmapped

DESCRIPTION: The driver is searching for a node table entry on the unmapped node list, based on the SCSI ID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0911: FIND node DID unmapped

DESCRIPTION: The driver is searching for a node table entry, on the unmapped node list, based on DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0912: N/A

DESCRIPTION: N/A

N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

elx_mes0913: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes0914: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

elx_mes0915: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

MODULE: N/A

ACTION: N/A

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elx_mes0916: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0917: N/A

DESCRIPTION: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0918: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0919: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0920: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0921: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0922: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0923: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0924: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0925: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes0926: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

elx_mes0927: GET nodelist

DESCRIPTION: The driver is allocating a buffer to hold a node table entry.

DATA: (1) bp (2) fc_free

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0928: PUT nodelist

DESCRIPTION: The driver is freeing a node table entry buffer.

DATA: (1) bp (2) fc_free

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

eelx_mes0929: FIND node DID unmapped

DESCRIPTION: The driver is searching for a node table entry, on the unmapped node list, based on DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0930: FIND node DID mapped

DESCRIPTION: The driver is searching for a node table entry, on the mapped node list, based on DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

elx_mes0931: FIND node DID bind

DESCRIPTION: The driver is searching for a node table entry, on the binding list, based on DID.

DATA: (1) nlp (2) nlp_DID (3) nlp_flag (4) data1

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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elx_mes0932: FIND node did <did> NOT FOUND

DESCRIPTION: The driver was searching for a node table entry based on the DID and the entry was not found.

DATA: (1) order

SEVERITY: Information

LOG: LOG_NODE verbose

ACTION: None required.

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FCP Target Mode Events (1100 - 1199)

1100 TMi message: LUN <lunNum> RDY blk <blkCnt> byt <byteCnt>

DESCRIPTION: Display TGTM LUN Ready status followed by the number of '512-byte' blocks and the total number of bytes.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fctarget.c

ACTION: None required.

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1101 TMi message: Line <num> HBA <num> has <num> LUNs cfg'd

DESCRIPTION: The number of LUNs that were successfully configured by configuration line <num> on HBA <num>.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fc<LINUX>fcp.c

ACTION: None required.

1102 TMi message: No LUNs configuration'd by line <num> on HBA <num>

DESCRIPTION: No LUNs were configured by the specified configuration line.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fc<LINUX>fcp.c

ACTION: If this configuartion is not intended, check the LUN configuration on the specified configuration line.

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1103 TMc message: Config line <num> starting LUN number <num> should be odd

DESCRIPTION: The starting LUN number on the specified configuration line is not odd.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line. The LUN sequence mode is odd, therefore the starting LUN number must be odd.

1104 TMc message: Config line <num> starting LUN number <num> should be even.

DESCRIPTION: The starting LUN number on the specified configuration line is not even.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line. The LUN sequence mode is even, therefore the starting LUN number must be even.

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1105 TMc message: Config line <num> has illegal The LUN sequence mode.

DESCRIPTION: The specified configuration line has an illegal LUN sequence mode.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line. The LUN sequence mode is illegal.

1106 TMi message: This config line <num> HBA <num> disabled per LOFF.

DESCRIPTION: The specified configuration line is diasbled.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fc<LINUX>fcp.c

ACTION: If this configuration is not intended, check the LUN configuration on the specified configuration line. The first member of the configuration structure can be set to disable the line (LOFF) or enable the line (LON).

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1107 TMi message: HBA <num> LUN info array failed to allocate.

DESCRIPTION: The main LUN information array for the specified HBA failed to allocate.

DATA: none

SEVERITY: error

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: This error is most likely caused by lack of host memory resources. Suggested actions:

- Add additional memory to the host.
- If multiple TGTM LUNs are configured, reduce the number of TGTM LUNs configured.
- Reduce the LUN size.

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1108 TMc message: Config line <num> starting LUN <num> > max LUN <num>.

DESCRIPTION: The starting LUN number on the specified configuration line is greater than the maximum LUN number allowed.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

1109 TMc message: Config line <num> has illegal LUN count <cnt> > max LUN <num>.

DESCRIPTION: The LUN count on the specified configuration line exceeds the maximum LUN number allowed.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

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1110 TMc message: Config line <num> has illegal LUN count <cnt> < 1

DESCRIPTION: The LUN count on the specified configuration line is less than 1.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

1111 TMc message: Config line <num> starting LUN <num> + cnt <cnt> > max LUN <num>

DESCRIPTION: The LUN count on the specified configuration line, plus the LUN count exceeds the MAX support LUN number.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

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1112 TMc message: Config line <num> has illegal The LUN sequence mode <mode>

DESCRIPTION: The specified configuration line has an illegal The LUN sequence mode.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

1113 TMc message: Config line <num> starting LUN <num> + od-ev LUN (cnt <cnt> * 2) > max LUN <num>

DESCRIPTION: The starting LUN number plus the LUN count on the specified configuration line exceeds the MAX supported LUN number. Note: Because the LUN sequence is odd or even, the LUN count is multiplied by two prior to adding it to the starting LUN number.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

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1114 TMc message: Config line <num> starting LUN <num> was prev cfg'd by line <num>

DESCRIPTION: The starting LUN number on the specified configuration line has been proviously configured by the specified configuration line.

DATA: none

SEVERITY: error config

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: Check the LUN configuration on the specified configuration line.

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1115 TMe message: LUN <num> failed to allocate info buffer

DESCRIPTION: The specified LUN failed to allocate an information buffer.

DATA: none

SEVERITY: error

LOG: always

MODULE: fc<LINUX>fcp.c

ACTION: This error is most likely caused by lack of host memory resources. Suggested actions:

- Add additional memory to the host.
- If multiple TGTM LUNs are configured, reduce the number of TGTM LUNs configured.
- Reduce the LUN size.

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1116 TMe message: LUN <num> mem alloc error during LUN population

DESCRIPTION: While attempting to populate the specified LUN, host memory resource allocation failed.

DATA: none

SEVERITY: error

LOG: always

MODULE: fcmemb.c

ACTION: This error is most likely caused by lack of host memory resources. Suggested actions:

- Add additional memory to the host.
- If multiple TGTM LUNs are configured, reduce the number of TGTM LUNs configured.
- Reduce the LUN size.

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1117 TMi message: HBA <num> LUNs Ready <total> last LUN <num>

DESCRIPTION: Display the number of LUNs ready and the last LUN number for the specified HBA.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fcmemb.c

ACTION: None required.

1118 TMi message: HBA <num> LUNs Ready <total>

DESCRIPTION: This message is displayed if at least one LUN was configured but no LUNs came ready. The total LUNs ready will always be 0.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fcmemb.c

ACTION: If this configuration is not intended, check the LUN configuration on the specified HBA.

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1119 TMe message: LUN <num> disk resource alloc error

DESCRIPTION: While attempting to populate the disk of the specified LUN, there was a resource allocation error.

DATA: (1) retStatus

SEVERITY: error

LOG: always

MODULE: fctarget.c

ACTION: This error is most likely caused by lack of host memory resources. Suggested actions:

- Add additional memory to the host.
- If multiple TGTM LUNs are configured, reduce the number of TGTM LUNs configured.
- Reduce the LUN size.

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1120 TMe message: LUN <num> SCSI WriteBuf resource alloc error

DESCRIPTION: While attempting to populate the SCSI write buffer of the specified LUN, there was a resource allocation error.

DATA: (1) retStatus

SEVERITY: error

LOG: always

MODULE: fctarget.c

ACTION: This error is most likely caused by lack of host memory resources. Suggested actions:

- Add additional memory to the host.
- If multiple TGTM LUNs are configured, reduce the number of TGTM LUNs configured.
- Reduce the LUN size.

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1121 TMe message: LUN <num> alloc error, unknown retStatus

DESCRIPTION: During LUN population, an unknown function return status was received.

DATA: (1) retStatus

SEVERITY: error

LOG: always

MODULE: fctarget.c

ACTION: This error could indicate a software driver problem. If problems persist report these errors to Technical Support.

1122 TMi message: LUN <num> SCSI WriteBuf bytes <num>

DESCRIPTION: Display the SCSI WriteBuf size for the specified LUN.

DATA: none

SEVERITY: information

LOG: LOG_TGTM verbose

MODULE: fctarget.c

ACTION: None required.

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1123 TMw message: Temporary lack of resources, no BPL full BDE buf

DESCRIPTION: Attempting to set up IOCB but there were no BPL full BDE buffers available. This condition should be temporary.

DATA: (1) retStatus

SEVERITY: warning

LOG: LOG_TGTM verbose

MODULE: fctarget.c

ACTION: None required.

1124 TMw message: Temporary lack of resources, no BPL partial BDE buf

DESCRIPTION: Attempting to set up IOCB but there were no BPL partial BDE buffers available. This condition should be temporary.

DATA: (1) retStatus

SEVERITY: warning

LOG: LOG_TGTM verbose

MODULE: fctarget.c

ACTION: None required.

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1125 TMw message: RcvRing <ringNum> is temporary out of posted bufs

DESCRIPTION: The specified receive ring is temporarily out of posted buffers. This should be a temporary condition.

DATA: (1) fc_missbufcnt (2) NoRcvBuf

SEVERITY: warning

LOG: LOG_TGTM verbose

MODULE: fctarget.c

ACTION: None required.

1126 TMw message: Config line <num> starting LUN number <num> should be odd

DESCRIPTION: The starting LUN number on the specified config line is not odd.

DATA: None

SEVERITY: error config

LOG: Always

MODULE: fc<host>fcp.c

ACTION: Check LUN configuration on specified configuration line. LUN sequence mode is ODD, therefore starting LUN number must be ODD.

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1127 TMw message: Config line <num> starting LUN number <num> should be even

DESCRIPTION: The starting LUN number on the specified config line is not even.

DATA: None

SEVERITY: error config

LOG: Always

MODULE: fc<host>fcp.c

ACTION: Check LUN configuration on specified configuration line. LUN sequence mode is EVEN, therefore starting LUN number must be EVEN.

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Miscellaneous Events (1200 - 1299)

elx_mes1200: Cannot unload driver while lpfcdiag interface is active

DESCRIPTION: An attempt was made to unload the driver while the DFC interface was active.

DATA: (1) refcnt (2) instance

SEVERITY: Error

LOG: Always

ACTION: Exit any application that uses the DFC diagnostic interface before attempting to unload the driver.

elx_mes1201: lpfc_kmalloc: bad phba

DESCRIPTION: The driver manages its own memory for internal use. This error indicates a problem occurred in the driver memory management routines. This error could also indicate the host system is low on memory resources.

DATA: 1) size (2) type (3) fc_idx_dmapool

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a driver or host operating system problem. If the problem persists, report the error to Technical Support.

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elx_mes1202: linux_kmalloc: Bad size

DESCRIPTION: The driver manages its own memory for internal use. This error indicates that a problem occurred in the driver memory management routines. This error could also indicate that the host system is low on memory resources.

DATA: (1) size (2) type (3) fc_idx_dmapool

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a driver or host operating system problem. If the problem persists, report the error to Technical Support.

elx_mes1203: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes1204: lpfc_kmalloc: bad virtual addr

DESCRIPTION: The driver manages its own memory for internal use. This error indicates that a problem occurred in the driver memory management routines. This error could also indicate that the host system is low on memory resources.

DATA: (1) i (2) size (3) type (4) fc_idx_dmapool

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a driver or host operating system problem. If the problem persists, report the error to Technical Support.

elx_mes1205: lpfc_kmalloc: dmapool FULL

DESCRIPTION: The driver manages its own memory for internal use. This error indicates that a problem occurred in the driver memory management routines. This error could also indicate that the host system is low on memory resources.

DATA: (1) i (2) size (3) type (4) fc_idx_dmapool

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a driver or host operating system problem. If the problem persists, report the error to Technical Support.

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elx_mes1206: linux_kfree: Bad phba

DESCRIPTION: The driver manages its own memory for internal usage. This error indicates a problem occurred in the driver memory management routines. This error could also indicate the host system in low on memory resources.

DATA: (1) size (2) fc_idx_dmapool

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a driver or host operating system problem. If the problem persists, report the error to Technical Support.

elx_mes1207: linux_kfree: NOT in dmapool

DESCRIPTION: The driver manages its own memory for internal use. This error indicates that a problem occurred in the driver memory management routines. This error could also indicate that the host system is low on memory resources.

DATA: (1) virt (2) size (3) fc_idx_dmapool

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a driver or host operating system problem. If the problem persists, report the error to Technical Support.

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elx_mes1208: C_CT request error

DESCRIPTION: The CT response returned more data than the user buffer could hold.

DATA: (1) dfc_flag (2) 4096

SEVERITY: Information

LOG: LOG_MISC verbose

ACTION: Modify the user application issuing a CT request to allow for a larger response buffer.

elx_mes1209: N/A

DESCRIPTION: N/A

DATA: N/A

SEVERITY: N/A

LOG: N/A

ACTION: N/A

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elx_mes1210: Convert ASC to hex. Input byte cnt <1

DESCRIPTION: ASCII string to hexadecimal conversion failed. The input byte count is greater than 1.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver problem. If the problem persists, report the error to Technical Support.

elx_mes1211: Convert ASC to hex. Input byte cnt > max <num>

DESCRIPTION: ASCII string to hexadecimal conversion failed. The input byte count exceeds max <num>.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver problem. If problems persist report, these errors to Technical Support.

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elx_mes1212: Convert ASC to hex. Output buffer to small

DESCRIPTION: ASCII string to hexadecimal conversion failed. The output buffer byte size is less than 1/2 of the input byte count. Every two input characters (bytes) require one output byte.

DATA: None

SEVERITY: Error

LOG: Always

ACTION: This error could indicate a software driver problem. If the problem persists, report the error to Technical Support.

elx_mes1213: Convert ASC to hex. Input char seq not ASC hex

DESCRIPTION: The ASCII hexadecimal input string contains a non-ASCII hex character.

DATA: None

SEVERITY: Error configuration

LOG: Always

ACTION: Make necessary changes to the lpfc configuration file.

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Link Events (1300 - 1399)

elx_mes1300: Re-establishing Link, timer expired

DESCRIPTION: The driver detected a condition where it had to re-initialize the link.

DATA: (1) fc_flag (2) fc_ffstate

SEVERITY: Error

LOG: Always

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

elx_mes1301: Re-establishing Link

DESCRIPTION: The driver detected a condition in which it had to re-initialize the link.

DATA: (1) status (2) status1 (3) status2

SEVERITY: Information

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

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elx_mes1302: Reset link speed to auto. 1G HBA cfg'd for 2G

DESCRIPTION: The driver is reinitializing the link speed to auto-detect.

DATA: (1) current link speed

SEVERITY: Warning

LOG: LOG_LINK_EVENT verbose

ACTION: None required.

elx_mes1303: Link Up Event <eventTag> received

DESCRIPTION: A link up event was received. It is also possible for multiple link events to be received together.

DATA:(1) fc_eventTag (2) granted_AL_PA (3) UlnkSpeed (4) alpa_map[0]

Detail: If link events received, log (1) last event number received, (2) ALPA granted, (3) Link speed (4) number of entries in the loop init LILP ALPA map. An ALPA map message is also recorded if LINK_EVENT verbose mode is set. Each ALPA map message contains 16 ALPAs.

SEVERITY: Error

LOG: Always

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

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elx_mes1304: Link Up Event ALPA map

DESCRIPTION: A link up event was received.

DATA: (1) wd1 (2) wd2 (3) wd3 (4) wd4

SEVERITY: Warning

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

elx_mes1305: Link Down Event <eventTag> received

DESCRIPTION: A link down event was received.

DATA: (1) fc_eventTag (2) hba_state (3) fc_flag

SEVERITY: Error

LOG: Always

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network.

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elx_mes1306: Link Down timeout

DESCRIPTION: The link was down for greater than the configuration parameter (lpfc_linkdown_tmo) in seconds. All I/O associated with the devices on this link will fail.

DATA: (1) hba_state (2) fc_flag (3) fc_ns_retry

SEVERITY: Warning

LOG: LOG_LINK_EVENT | LOG_DISCOVERY verbose

ACTION: Check the HBA cable/connection to the Fibre Channel network.

elx_mes1307: READ_LA mbox error <mbxStatus> state <hba_state>

DESCRIPTION: The driver cannot determine what type of link event occurred.

DATA: None

SEVERITY: Information

LOG: LOG_LINK_EVENT verbose

ACTION: If numerous link events are occurring, check the physical connections to the Fibre Channel network. May indicate a possible hardware or firmware problem.

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SLI Events (1400 - 1499)

1400 SLe message: Unknown IOCB command

DESCRIPTION: Received an unknown IOCB command completion.

DATA: (1) ulpCommand (2) ulpStatus (3) ulpIoTag (4) ulpContext

SEVERITY: error

LOG: always

MODULE: lp6000.C

ACTION: This error could indicate a software driver or firmware problem. If this problem persists, report this error to Technical Support.

1401 SLe message: Command ring <num> timeout

DESCRIPTION: An IOCB command was posted to a ring and did not complete within a timeout based on R_A_TOV.

DATA: (1) IOCB command (2) ulpCommand

SEVERITY: error

LOG: always

MODULE: fcscsib.c

ACTION: This error could indicate a software driver or firmware problem.If no I/O is going through the adapter, reboot the system. If this problem persists, report this error to Technical Support.

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1402 SLe message: Command ring <num> timeout

DESCRIPTION: An IOCB command was posted to a ring and did not complete within a timeout based on R_A_TOV.

DATA: none

SEVERITY: error

LOG: always

MODULE: fcscsib.c

ACTION: This error could indicate a software driver or firmware problem. If no I/O is going through the adapter, reboot the system. If this problem persists, report this error to Technical Support.

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Log Messages - IOCTL Events (1600 - 1699)

elx_mes1600: dfc_ioctl entry

DESCRIPTION: The entry point for processing diagnostic ioctl.

DATA:(1) c_cmd (2) c_arg1 (3) c_arg2 (4) c_outsz

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: None required.

elx_mes1601: dfc_ioctl exit

DESCRIPTION: The exit point for processing diagnostic ioctl.

DATA: (1) rc (2) c_outsz (3) c_dataout

SEVERITY: Information

LOG: LOG_IP verbose

ACTION: None required.

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elx_mes1602: dfc_data_alloc

DESCRIPTION: Allocating data buffer to process dfc ioct.

DATA: (1) fc_dataout (2) fc_outsz

SEVERITY: Information

LOG: LOG_IOC verbose

ACTION: None required.

elx_mes1603: dfc_data_free

DESCRIPTION: The data buffer is being freed to process dfc ioct.

DATA: (1) fc_dataout (2) fc_outsz

SEVERITY: Information

LOG: LOG_IOC verbose

ACTION: None required.

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elx_mes1604: lpfc_ioctl:error

DESCRIPTION: The SCSI send request buffer size limit was exceeded.

DATA: (1) error number index

SEVERITY: Error

LOG: Always

ACTION: Reduce the application program's SCSI send request buffer size to less then 320K bytes.

elx_mes1605: Issue Report LUN on NPort <nlp_DID>

DESCRIPTION:The driver issued an Ioctl REPORT_LUN SCSI command to a FCP target.

DATA: (1) nlp_failMask (2) nlp_state (3) nlp_rpi

SEVERITY: Information

LOG: LOG_IOC verbose

ACTION: None required.

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